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Predictors of Successful

Team-based Testing

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Predictors of Successful

Team-based Testing

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Dedication

<To my mother, without whose love and nurturing none of this would have been possible.>

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Predictors of Successful Team-based Testing

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The objective of this study was be to find predictors of low- and high-performing teams with the further objective of using this information for future group formation. This study examined one particular implementation of team-based learning in an attempt to discover valid predictors of team performance at the undergraduate level (n=101). Team-based learning is an instructional strategy based on the social constructivist theory of Vygotsky and the socio-cognitive conflict theory of Piaget. Students were measured on a variety of constructs such as instrumentality, expressiveness, motivation, self-monitoring behavior, social self-efficacy, epistemological beliefs and self construal, in addition to team and individual performance. Individual test and quiz performance and team games performance, a measure of attendance and participation, were correlated with team test and quiz performance (Pearson's r = .31 and .42. respectively, $p<.01$) and predicted team performance (Beta weights = .290 and .412 respectively, $p<.001$). Implications of these results for team formation are discussed.

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Chapter 1 Introduction

More research on learning in small groups exists than on any other instructional method, including lecturing (Johnson, Johnson, & Smith, 1991; Slavin, 1989, 1990). One of the most prominent theoretical perspectives on how students learn from interacting with others is based on the social constructivist view of Vygotsky (1978). From this perspective, children's mental functioning develops first at the interpersonal level where they transform the content of interpersonal interactions with others and internalize at the intra-personal level the new knowledge or skills as these become part of their own understanding and skills. Another perspective on small group learning is based on Piaget's (1932) theory of socio-cognitive conflict, which occurs when children are forced to reconsider their understandings and perspectives in light of the contradictory opinions of others. Some classify these two perspectives (Gillies & Ashman, 2003) as social constructivist and personal constructivist, respectively; however, it is clear that both perspectives are similar in that socially shared information transforms personal understandings.

Interest in cooperative learning has grown steadily over the past 30 years as more research has been published that clearly demonstrates the benefits that accrue to students who work cooperatively as opposed to those who work individually in traditional classrooms (Johnson et al., 2000; Slavin, 1995). Springer, Stanne, and Donovan (1998), in a meta-analysis of cooperative learning since 1980, reported the effect size of small-group learning on achievement was .51, the effect on students' persistence was .46, and the effect on students' attitudes was .55.

In 2006, in the midst of the social constructivist movement, no self-respecting teacher wants to admit that he still exclusively stands in front of, and lectures to, his classes. An overwhelming majority of teachers, 81% by some accounts (see Slavin, 1995), report using cooperative learning at least some of the time. It seems virtually everyone wants to get on the bandwagon. Unfortunately, sometimes these groups, rather than deliver the impressive results often reported (see Johnson & Johnson, 1989; Slavin, Hurley, Chamberlain, Reynolds, & Miller, 2003) are ineffective. Simply placing individuals in groups and/or telling them to work together does not necessarily promote higher achievement and greater productivity (Johnson & Johnson, 1989). There are many ways the group process can go wrong including: the free rider effect (Kerr & Bruun, 1983), where less able members leave the work to those perceived as more capable until those members, resenting the free riders, expend decreasing amounts of effort toward team goals; the sucker effect (Kerr, 1983), where the more capable team member tries to avoid being taken advantage of and so expends as little effort as possible; diffusion of responsibility, where no one member actually takes responsibility for any specific thing; social loafing (Latane, Williams, & Harkins, 1979), the dysfunctional division of labor (Sheingold, Hawkins, & Char, 1984), e.g., "I'm the thinkist and you're the typist," and others. including the rich-get-richer effect discussed below.

The rich-get-richer, or the Matthew effect (Merton, 1968), wherein more capable members are deferred to and may take over control of the group, thereby reaping the rewards at the expense of the other group members, is a common cooperative group problem.

Only under certain conditions can cooperative efforts be expected to be more productive than competitive or individualistic efforts (Johnson & Johnson, 1989). The conditions that seem to promote successful cooperation are: clearly perceived positive interdependence; considerable face-to-face interaction; and frequent use of relevant interpersonal and small group skills.

Positive interdependence exists when one perceives that one's success is dependent on others; or, that one must coordinate one's efforts with others to complete a task. An individual's behavior in a given situation is determined in large part by that individual's perception of desired outcomes and the means by which those outcomes may be reached. When people are organized in a cooperative situation, they must have a goal in mind. If there is no outcome interdependence there is no cooperation. There are two types of outcome interdependence: goal interdependence and reward interdependence. Goal interdependence refers to individuals cooperating toward the same goal. Deutch (1962) and Johnson and Johnson (1974, 1983, 1987) state that goal interdependence mediates the relationship between cooperation and achievement. From this perspective, given the perception of positive interdependence, individuals will help each other accomplishment their goals, providing they have the skills to do so. Reward interdependence refers to individuals being dependent on the members of the cooperative group to attain a desired reward. Hayes (1976) and Slavin (1983) state that positive reward interdependence explains the relationship between cooperation and achievement. From this perspective, individuals will achieve more only if there exists a specific group contingency reinforcing them for doing so, and help each other only if there is a specific reward reinforcing them for helping the group. A series of studies attempting to contrast

the two theoretical positions found that reward and goal interdependence seem to be additive; that is, groups structured to include both goal and reward interdependence achieved better results than groups structured to include only one or the other.

Promotive interaction may be defined as individuals encouraging and facilitating each other's efforts to achieve, complete tasks, and produce in order to reach the group's goals (Johnson and Johnson, 1989). Promotive interaction is said to exist when individuals provide each other help, exchange information and materials, process information more effectively and efficiently, provide each other with feedback to improve future group performance, challenge each other's reasoning to promote better decisions and deeper insights, challenge each other to exert more effort to achieve group goals, trust each other and act in a trustworthy manner, are motivated and strive for mutual benefit, and are aroused moderately with low anxiety and stress levels.

Social skills may be taught implicitly or explicitly. Some say that if group members lack the necessary skills to interact effectively, cooperative groups will not be productive (Napier & Gerschenfeld, 1981). However, there are those who believe that structuring a group task appropriately, so that members are adequately motivated, will result in successful group interaction (Slavin, 1983). Slavin's particular research interest is in comparing outcomes of various models of cooperative learning as well as comparing cooperative learning groups with traditional control groups. Slavin (1996) analyzed 90 studies and concluded that achievement under cooperative learning was positive, the effect size depending on the particular structure of cooperative learning. Slavin's most important conclusion is that the effect of cooperative learning is greatest when groups are rewarded based on the individual learning of the members. In an earlier work Slavin

(1990) concluded that cooperative learning methods can be an effective means of increasing achievement only if they incorporate group goals and individual accountability.

Simply being a member of a cooperative group in and of itself does not promote higher achievement; neither does interacting with others without positive interdependence (Hagman and Hayes, 1986). Without positive interdependence there is no advantage to having individuals interact with each other as they work.

Groups must be formed in such a way as to avoid establishing groups whose membership characteristics are likely to interfere with the cohesion-forming process (Michaelsen, Knight, & Fink, 2002). To this end, groups are formed by the instructor with the goal of attaining inter-group homogeneity and intra-group heterogeneity. Students are sorted by ethnicity, gender, particular background knowledge, college program, etc. Groups are formed with the goal of evenly distributing these variables among groups. In this way, as much difference as possible is included in each group, providing as much varied input as possible to group discussions. It has been found that heterogeneous groups often have a little more difficulty establishing cohesion than homogeneous groups; but, tend to catch up to, and possibly surpass homogeneous groups within a semester (Watson et al, 1993). Inter-group homogeneity ensures that teams have approximately equal resources. This is important when teams compete for extra points to avoid the problems associated with perceptions of unfair division of resources. Additionally, groups must have approximately the same talent pool to draw from in completing their assignments. In order to meet these conditions it is necessary to obtain and analyze some background information about the students who will form these

groups. This study will attempt to determine which of several constructs is more useful in predicting successful group process.

One unique challenge to college instructors that small group work may address is teaching large sections (more than 30 students) of undergraduate courses. Small group work produces benefits that cannot be achieved with students working individually in the normal passive role promoted in most classrooms (see Bargh & Schul, 1980; Fiechtner & Davis, 1985; Slavin & Karweit, 1981). A specific type of small group learning is team-based learning (TBL). TBL promotes achievement of learning outcomes such as developing students' higher-level cognitive skills in large classes, providing social support for at-risk students, and promoting the development of interpersonal and team skills (Michaelsen, Watson, Schwartzkopf, & Black, 1992; Watson, Michaelsen, & Sharp, 1991).

Large classes typically create two conditions that foster negative student attitudes and inhibit learning: student anonymity and passivity (Michaelsen, Stanley, & Porter, 2002). TBL addresses these conditions using in-class, content-focused group work to change the social fabric of the learning environment.

In this study, one particular implementation of team-based learning is examined. The context is a large, public university in the Southwest. The particular classes examined are undergraduate introductory statistics courses, taught within the educational psychology program within the school of education. Because this basic statistics course is a requirement of many different degree programs, the students come from widely varying backgrounds. A typical statistics course may be composed of students from the schools of

nursing, social work, education, communication, and liberal arts. Additionally, this university has an ethnically diverse population, including many international students.

Class sizes are typically around 70 students. The basic statistics content is presented with a textbook. Readings are assigned, following which students are quizzed to ascertain whether they have read the assigned material. The instructor then lectures on the material. Following lectures, review sessions (or team games, which are collaborative activities that serve as review) are conducted and then students are quizzed on the material. All tests and quizzes are first taken individually and then as a group. Groups are assigned by the instructor the first week of classes with the goal of inter-group homogeneity and intra-group heterogeneity, as described above. Quiz format is multiple choice. After students take the quiz individually, they turn in their answer sheets, retain the question sheet and join their group. Each group is provided with one scratch-off answer sheet. The answers are concealed and when the group chooses an answer, the chosen answer is scratched. If the correct answer is chosen a star is revealed when the sheet is scratched; if the incorrect answer is chosen, nothing is revealed. When groups complete the quiz, they turn in the scratch-off answer sheet and the question sheets. One point is awarded for first attempt right answers and a half point is awarded for second attempt correct answers. Members of the highest-scoring team, or teams if there is a tie, are awarded 3 bonus points that are added to the individual quiz score. Members of the second highest-scoring team or teams receive 2 bonus points, and members of the third highest-scoring team are awarded 1 bonus point.

Unfortunately, previous experience has shown that some groups never receive any bonus points, lose hope, and eventually give up. These groups often do not gel from the

first. For whatever reason (e.g., individual characteristics, group dynamic, etc.), sometimes groups never seem to coalesce into effective teams.

Knight and Bohlmeyer (1990), citing Johnson and Johnson (1985), Kagan (1986), Sharan and Shaulov (1990), Nijof and Kommers (1985), and Slavin (1983), have suggested five broad categories of causal mechanism for the effects of cooperative learning: social influences, cognitive processing influences, academic task structure influences, reward structure influences, and participant's role influences. This wide-ranging review and categorization of the research on cooperative learning says nothing of the influence of individual personality factors on successful group process.

Flynn, Chatman, and Spataro (2001) tested the hypothesis that people will be more likely to form positive impressions of demographically similar colleagues and negative impressions of demographically different colleagues. Using the personality dimensions of extraversion and self-monitoring, they found that demographically different people who are more extraverted or higher self-monitors may provide more information or more desirable information, respectively, that disconfirms negative stereotypes held by demographically similar people. These findings suggest that certain individual differences can interact with demographic differences to increase the likelihood that in-group members will re-categorize out-group members as fellow in-group members, or at least refrain from imposing negative out-group stereotypes on a particular out-group member. This research supports the contention of Michaelsen et al (2002) that heterogeneous groups potentially perform at higher levels than homogeneous groups.

An interesting web-based report on cooperative learning in a college level chemistry course (http://www.wcer.wisc.edu/nise/CL1/CL/story/middlecc/TSCMA.htm) includes disadvantages experienced by participants. These disadvantages include personality factors such as members who don't always cooperate, don't always get along, sometimes argue too much, whose personalities sometimes clash. In addition to specific race, gender, and age issues participants were asked about, they listed as disadvantages people's pre-conceived notions and stereotypes, (in)ability to socialize, work ethic, group members who have "no personality and take everything too seriously," (un)willingness to compromise and respect others' opinions, not liking to work with people, independence, and control issues. Oddly enough, this report also contains nearly as many disavowals of any personal factors of members themselves that might affect group process, as well as disavowal of any personal factors in others that might interfere negatively with group process. This seems to speak either to undergraduate students' inability or unwillingness to discuss such sensitive matters with their professor.

In an effort to determine what individual characteristics might predict a successful team process, an instrument was administered at the beginning of the course and groups were recorded and observed in an attempt to ascertain which if any individual characteristics seemed to inhibit or promote successful group process. The instrument measured students on a variety of constructs such as instrumentality/expressiveness, performance/mastery motivation, intrinsic/extrinsic motivation, self-monitoring behavior, social self-efficacy, commitment to/desire for grade, epistemological beliefs, and self construal.

Two groups' team interactions in each course were observed and recorded. The recordings were transcribed. These transcripts were then analyzed and coded. These data were correlated with constructs measured with the instrument as well as with individual scores, team scores, and observation data.

The objective of this research was to find specific personality factors that might predict low-performing and high-performing groups with the further objective of adding to the information currently being used for group formation. It was expected that this information will result in a more efficient method for selecting which particular individuals will perform the most effectively in which particular groups while minimizing the wasted effort and de-motivation currently experienced by members of low-performing groups.

Chapter 2 Literature Review

The bulk of theoretical analysis and empirical inquiry regarding learning has been created in the context of individual learning (Kasl, Marsick, & Dechant, 1997). Therefore, the claim that "…individual learning, at some level, is irrelevant…" (Senge & Massarik, 1990) cannot be taken too seriously. Although team learning continues to proliferate, in academia as well as business, the theories underpinning team learning have been, for the most part, developed from an understanding that a group or team consists of individuals whose combined learning constitutes the learning of the team. Using groups produces benefits that cannot be achieved with students in the normal passive role promoted in most classrooms (see Bargh & Schul, 1980; Fiechtner & Davis, 1984; Slavin & Karweit, 1981).

According to Slavin, Hurley, Chamberlain, Reynolds, and Miller (2003), one of the greatest achievements of educational psychology over the past century has been the research conducted on the effects of cooperative learning on student achievement. Since 1970 there have been hundreds of studies conducted, in every major subject, at all grade levels, in multiple types of educational settings, and in many different countries. Cooperative learning is used in some form by millions of teachers. A national survey (Antil, Jenkins, Wayne, & Vadasy, 1998) found that 81% of teachers reported using cooperative learning daily.

GROUP LEARNING

With overwhelming empirical support at the elementary and middle school levels (e.g., Cohen, 1994; Johnson & Johnson, 1989; Sharan, 1990; Slavin, 1995), based

primarily on grades two through nine, it is no longer necessary to establish cooperative learning as a "legitimate method of instruction that can help students to learn" (Cohen, 1994, p. 30). In fact, the meta-analysis conducted by Johnson and Johnson (1989) found that cooperative learning exceeded both competitive and individualistic efforts at promoting effort to achieve, quality of interpersonal relationships, and psychological health and social competence at all age levels from K-12 to college undergraduates to graduate students and adult learners.

There are many different configurations of learners in groups, from peer learning to dyadic learning, to collaborative learning, to cooperative groups, to the Jigsaw method, etc.

Peer learning

Peer learning refers to the use of teaching and learning strategies in which students learn with and from each other without the immediate intervention of a teacher (Boud, Cohen & Sampson, 1999). Such approaches may be established and monitored by staff, and may even occur in their presence, but staff are not involved directly in teaching or controlling the class. Examples of peer learning include student-led workshops, study groups, team projects, student-to-student learning partnerships and peer feedback sessions in class. In reciprocal peer learning students within a given cohort act as both teachers and learners. This is in contrast to *peer teaching* in which there is a clear and consistent differentiation between the teaching and learning role, although all parties may be students. Peer teaching commonly involves advanced students in the same class, or

those in later years, taking on limited aspects of a teacher's instructional or pedagogic role.

Dyadic learning

Slavin (1995) cites several examples of dyadic learning, including the series of studies by Dansereau (1988) and his colleagues in which pairs of college students proceeded through a structured sequence of activities to help each other learn complex technical information or procedures (see O'Donnell & Dansereau, 1992). Also, two Dutch studies of spelling involved dyads and where the study behavior (quizzing each other in turn) was structured and obviously beneficial (Van Oudenhoven, Wiersma, & Van Yperen, 1987; Van Oudenhoven, Van Berkum, & Koopmans, 1987). These methods allow the teacher to directly motivate students to engage in structured turn taking behaviors known to increase learning. The successful use of structured dyadic tasks in elementary schools seems largely limited to lower level, rote skills such as memorizing multiplication tables, spelling lists, or place names.

Jigsaw

Jigsaw is the name of a learning method designed by Elliot Aronson and colleagues (Aronson, Blaney, Stephan, Sikes, and Snapp, 1978). In the jigsaw method, students are assigned to six-member teams to work on material that has been divided into sections. Each team member reads a section. Then the members of the different teams who have read the same material get together in "expert groups" to discuss their sections. The students then return to their original groups and take turns teaching their teammates about their section. Students are motivated to listen to their teammates because that is the

only way to learn the other "pieces" of the jigsaw. Students are then tested over all the material.

Team-based learning

The idea of team-based learning originated with Larry Michaelsen in the late 1970s at the University of Oklahoma (see Michaelsen, Knight, and Fink, 2002). Team-based learning, through the use of group activities and assignments promotes the achievement of learning outcomes such as developing students' higher-level cognitive skills in large classes, provides social support for at-risk students, and promotes the development of interpersonal and team skills (Michaelsen, Jones & Watson, 1993; Watson, Michaelsen, & Sharp, 1991).

COOPERATIVE VS. COLLABORATIVE LEARNING

There exists in the literature some conflation of the terms cooperative and collaborative learning. Different authors use the terms to describe overlapping ideas. In fact, this overlap or inter-concept usage, is so widespread that many authors have deliberately attempted to specify and clarify the precise differences between the two types of learning. Both cooperative and collaborative learning spring from the same underlying constructivist epistemology, which holds that knowledge is constructed, discovered, and transformed by students (Johnson, Johnson & Smith, 1991).

A basic definition of the terms collaboration and cooperation appearing in Panitz (1999) may be helpful. Collaboration is a philosophy of interaction where individuals are responsible for their actions, including learning, and respect the abilities and contributions of their peers. Cooperation is a structure of interaction designed to facilitate

the accomplishment of a specific end product or goal through people working together in groups.

Ken Bruffee (1995) describes the differences between collaborative and cooperative learning as differences of sophistication of students with collaboration requiring more advanced student preparation. Bruffee contends that cooperative learning is best suited for learning foundational knowledge such as basic grammar, mathematical procedures, history facts, etc; whereas, collaborative learning is ideally suited to learning non-foundational knowledge derived through reasoning and questioning versus rote memory.

Spencer Kagan (1989) distinguishes between structures and activities in his differentiation of collaborative and cooperative learning. Kagan writes that cooperative learning generally is composed of specific, content-bound objectives, used to deliver specific academic content. Collaborative learning on the other hand consists of structures which may be used repeatedly with almost any subject matter.

John Myers (1991), basing his distinction between collaborative and cooperative learning on etymologies, writes that dictionary definitions of collaboration focus on the process of working together; whereas, definitions of cooperation focus on the product of such working together. Myers writes that cooperation has largely American roots stemming from the social learning theory of John Dewey and the group dynamics work of Kurt Lewin. Collaborative learning on the other hand, has largely British roots, stemming from the work of English teachers attempting to facilitate student response to literature and students taking responsibility for their own learning. Myers describes cooperative learning as more teacher centered and collaborative as more student centered.

Rockwood (1995) describes the major differences between cooperative and collaborative learning as cooperative dealing exclusively with traditional or canonical knowledge while collaborative learning, in the constructivist vein, asserts that knowledge and authority of knowledge have changed dramatically.

Brody & Davidson (1998) analyze the two types of learning from the perspective of theoretical predecessors. As a result of research in the 1970's based on human social interaction and group learning, some educators formulated cooperative learning strategies based on behavioral learning theory, cognitive developmental theory and social interdependence theory. Meanwhile, social constructivists based their framework for group work on studies of the social nature of human knowledge. This framework led to the collaborative model of learning.

Johnson, Johnson & Smith (1998) describe the three major theoretical perspectives as follows: social interdependence theory focuses on relational concepts and what happens among individuals while assuming intrinsic motivation and joint aspirations; cognitive developmental theory focuses on what happens within a single individual; behavioral learning theory assumes extrinsic motivation to achieve rewards.

It seems as though the preceding authors would agree that cooperation and collaboration could be opposite ends of a continuum. The end points could be described as rigid vs. loose organization, teacher vs. student centered, rote vs. creative learning, extrinsic vs. intrinsic motivation, product vs. process focused, dependent vs. independent learners. While the endpoints of this continuum are fairly easy to describe, most learning methodologies are generally composed of some combination of these factors. So the problem becomes deciding just where on the continuum a particular methodology lies.

Collaborative learning

Collaborative learning involves individuals working together to construct knowledge rather than discover objective truths. Imel (1991) points out that in collaborative learning, we assume that knowledge is socially produced by communities or groups and anyone can participate in the process of shaping and testing ideas.

COOPERATIVE LEARNING

Although cooperation and collaboration are often synonyms in dictionaries, in group learning they have come to have distinctly different meanings. Cooperative learning is a structured process which requires learners to work together on a task, share information, and encourage and support each other (Slavin, 1986). The sheer amount of research conducted in an effort to understand cooperative learning reflects a consensus concerning the enormous beneficial effects on achievement. The question is no longer whether cooperative learning has an enormous effect on student achievement; but rather, which particular type of cooperative learning is the most beneficial.

There are many different forms of cooperative learning. Slavin (1983) lists the following six types:

- Group study with group reward for individual learning,
- Group study with group reward for group product,
- Group study with individual reward,
- Task specialization with group reward for individual learning,
- Task specialization with group reward for group product,
- Task specialization with individual reward

A meta-analysis conducted by Slavin (1995) found that the most effective forms of cooperative learning include individual accountability and group goals. Because of the small size of the groups, generally 4-5, all members have the opportunity to participate

and contribute. Individual accountability guards against the phenomenon of social loafing, defined as: individuals exerting less effort when their efforts are combined than when they are considered individually (Latane, Williams, & Harkins, 1979). Group goals necessitate students helping each other if the group is to succeed. Task specialization allows members of small groups to concentrate on subtasks and thereby learn more detail at a deeper level possible than learning the whole subject at a more superficial level. Adaptation to individual needs allows members some autonomy, some control over the learning process. Slavin lists team competition among his characteristics of cooperative learning; but, this inclusion has been questioned (Kohn, 1992). While some activities, such as sports, are widely acclaimed as promoting teamwork, their most important lesson may be that the ultimate reason to cooperate is to defeat a common enemy.

Competition

In the sports education literature (Wolf-Wendel, Toma, & Morphew, 2001) both student athletes and coaches say what brings people together is the idea of "us vs. them." Having a common "enemy" helps teammates develop bonds with one another. Inter-group competition has been shown to increase intra-group cohesiveness (Shaw, 1981) and some instructors encourage friendly competition among teams.

Theoretical Perspectives on Cooperative Learning

Slavin (1989, 1992, and 1995) has identified four major theoretical perspectives on the achievement effects of cooperative learning: motivationalist, social cohesion, cognitive-developmental, and cognitive elaboration.

The motivationalist perspective assumes that learners are driven by motivated self-interest and focuses on the reward or goal structure.

The social cohesion or social interdependence theory suggests that effects of cooperative learning are due primarily to group cohesion. This perspective asserts that the individual helps the group because he or she cares about the group and derives self-identity benefits from group membership (Hogg, 1987; Johnson & Johnson, 1989, 1999; Turner, 1987).

Cognitive developmentalists hold that the interactions among students, as outlined by Piaget (1950) and Vygotsky (1978), lead to better learning and achievement. The cognitive elaboration perspective asserts that cognitive restructuring of new material is the most important aspect of learning.

Among the four different perspectives on cooperative learning, far and away the most evidence seems to indicate that achievement effects are best supported by a structure in which the only way an individual can succeed is if one's group succeeds. Several reviews of the cooperative learning literature have concluded that the most consistently effective forms of cooperative learning all reward groups based on individual learning (Davidson, 1985; Ellis & Fouts, 1993; Manning & Lucking, 1991; Mergendoller & Packer, 1989; Newman & Thompson, 1987; Slavin, 1983, 1989, 1992, 1995). If a group can succeed only by its members succeeding, then members will be motivated to learn the material themselves as well as ensure that all other members learn the material as well.

Johnson and Johnson (1996) make an elegant argument that cooperation promotes American values. They say that while it is difficult to come to a consensus as to exactly

what values should be taught in American schools, we can all probably agree that the underlying instructional methods in the United States should promote the values described in the Declaration of Independence and the United States Constitution. The founders of the United States proposed a democracy based on the premise that we work together to pursue life, liberty, and happiness for all Americans. The Constitution reemphasizes the need for joint efforts by stating that we, the people of the United States, commit ourselves to form a more perfect union to establish justice, provide for the common defense, ensure domestic tranquility, promote the general welfare, and ensure the blessings of liberty for all Americans. "Which instructional method best teaches such traditional American values?" ask the Johnson brothers. Individualistic efforts are based on an absence of interdependence and cast everyone as separate individuals whose efforts are independent. Cooperation is based on a mutual responsibility to work for our own success and the success of all group mates. Success in cooperative groups results from joint efforts. The individual's efforts promote not only the individual's well-being, but also promote the general welfare.

The Johnsons (Johnson & Johnson, 1996) have compiled impressive statistics regarding cooperative learning. Over 600 studies have been conducted during the past 90 years comparing the effectiveness of cooperative, competitive, and individualistic efforts. These studies have been conducted by a wide variety of researchers in different decades with subjects of different ages, in different subject areas, and in different settings. More is known about the efficacy of cooperative learning than about lecturing, departmentalization, the use of instructional technology, or almost any other aspect of education. The more one works in cooperative learning groups, the more that person

learns, the better he understands what he is learning, the easier it is to remember what he learns, and the better he feels about himself, the class, and his classmates.

So if the benefits of cooperative learning are so well known, why aren't they employed more than they are? Some lay the blame at the feet of the ideology of American education (Kohn, 1992). Cooperation is threatening to, or incongruous with, the beliefs that many teachers hold. Some of the major incongruities are that cooperative learning reduces control and predictability, demands attention to social goals, challenges our commitment to individualism, and challenges our commitment to the value of competition. Kohn sees cooperative learning being diluted to fit more comfortably into American education ideology.

Essential Elements of Successful Group Learning

In his book, Cooperative Learning, (Slavin, 1995) lists six principal characteristics of cooperative learning as:

- Group goals – cooperative groups must work toward a group goal such as certificates or other recognition, bonus points on their grades, etc.
- individual accountability – groups must be rewarded based on the average of their members' individual scores
- equal opportunities for success -
- team competition – not individuals but teams compete against each other for bonus points or other recognition
- task specialization – each member of the group knows his or her contribution to the group is unique
- adaptation to individual needs

Johnson and Johnson (1989) are widely cited when authors list the essential elements of cooperative learning which usually include the following:

- Positive interdependence – one is linked to others in such a way that one cannot succeed unless they do (and vice versa) and/or one

must coordinate one's efforts with those of others to complete a task.

- Promotive (face-to-face) interaction – individuals encourage and facilitate each others' efforts to achieve, complete tasks, and produce in order to reach the groups goals.
- Social skills – individuals must be taught the interpersonal and small group skills needed for high quality cooperation, and be motivated to use them.

TEAM-BASED LEARNING (TBL)

TBL is a learning methodology which incorporates many practices which have been well-researched and shown to be effective parts of cooperative learning. TBL was developed 20 years ago at the University of Oklahoma Business school by Michaelsen in response to rapidly increasing class sizes. The basic components of TBL and their bases in research follow.

1) Permanent and purposefully heterogeneous work groups. (Watson, Johnson, Kumar, 1998; Watson, Johnson, Zgourides, 2002)
2) grading based on a combination of individual performance, group performance, and peer evaluation (Slavin, 2003; Johnson & Johnson, 2000)
3) majority of class time devoted to small-group activities
4) a six-step instructional activity sequence

    Individual Study - individuals read assigned course material

    Individual Test - multiple choice conceptual questions over assigned reading material.

    Group Test - same questions as individual tests: groups are given immediate feedback on their answers.

    Preparation of Written Appeals - groups prepare appeals of any answers

they disagree with.

Instructor Input - instructor addresses material tests indicate students have not learned.

Application-Oriented Activities which resemble tasks or activities learners should be able to complete after instructional unit.

TBL attempts to find all the relevant differences between people, i.e., sex, race, specific subject matter knowledge, etc. and distribute those variables evenly among the teams. Then TBL says that teams should stay together permanently (for the duration of the semester). This is necessary so that groups become teams; that is, so that groups can cohere or coalesce.

TBL proponents insist that the structure of activities of the group is important. The group must work on exercises that force them to discuss possible answers to problems where there is only one possible answer. This forces the group to come to a consensus.

Feedback timing

Additionally important in TBL is immediate feedback. This allows the team to find out immediately whether their consensual answer was correct or not. This feedback allows the team not only to reflect on the subject matter but to also immediately reflect on the group process. If the consensual answer was right the group is reinforced. If the group answer was wrong (Michaelsen, Knight, & Fink, 2002), the group immediately recognizes that the loud dominator (big-mouth) is at fault as well as the reticent genius (mousy). The assumption is that the result of this feedback is that next time big-mouth

will dominate less and mousy's input will be more valued, if not sought out. Students need not wait until the end of the test to get a sense for which of their team-mates best understand the content. Kulik and Kulik (1988) reported that the smaller the delay in feedback timing for individuals, the better for their performance and retention; however, there is little or no discussion of this issue in the general literature on cooperative learning.

One possible outcome of the preceding process, is the "rich get richer" or "Matthew" effect wherein the higher-performing group member at the individual level comes to dominate the team, reaping more of the cognitive rewards than the other lower-performing members. The Matthew effect, so named after the biblical passage:

> For unto every one that hath shall be given, and he shall have abundance:
> but from him that hath not shall be taken away even that which he hath.
> (Matthew, XXV, 29)

Cook & Campbell (1979, pp. 184-185) interpret the preceding passage to mean that those who score higher on pretests or other desirable attributes relevant to a treatment at the beginning of an experiment gain absolutely and relatively more than others from the same experience. This effect has been documented in the way scientific recognition is awarded (Merton, 1968), in K-12 reading achievement (Stanovich, 1986), the mainstream educational research (Walberg & Tsai, 1983; Walberg et al, 1984), as well as in the role of group composition on cooperative learning groups (Onwuegbuzie, Collins, & Elbedour, 2002).

The preceding describes only the readiness assurance test (RAT) process; although this is exact process can be used for the test at the end of a unit. Michaelsen also emphasizes the application-based exercises/projects. These team projects/exercises are

relatively important, taking up to50% of class time. Because a class that only assembles students in teams to take tests cannot spend more than 10-20% of class time using teams, how can TBL possibly expect to experience the benefits Michaelsen claims? In a 2003 study, Lusk and Conklin examined just this situation. They used teams only for test taking. Their results indicated that students in the collaborative condition scored just as well as the control group. There were also indications that students' test-taking skills improved relative to the controls. Collaborative testing provided students the opportunity to learn critical thinking and collaborative skills. Additionally, all students in the collaborative condition reported lower levels of test anxiety; so, even a limited implementation of cooperative learning can be beneficial to students.

Johnson and Johnson (1989), Slavin (1990), and others (Sharan, 1990; Millis and Cottell 1998; Gillies and Ashman, 2003) discuss cognitive, social, and motivational benefits. Slavin (1990) emphasizes the cognitive developmental perspective as well as a cognitive elaboration perspective. Now the elaboration is easy: learners learn at a deeper level by elaborating their knowledge. So in team work, if grades are based on all members' scores, then the more advanced students will teach the less advanced students. In this situation the less advanced student benefits from the more advanced students' conversations as well as the more advanced students learn at a deeper level by manipulating knowledge they already have. Michaelsen (2002) says that in the process of coming to a group consensus, team members must elaborate their knowledge by attempting to persuade the rest of the team to their view point.

The cognitive developmental perspective refers to students developing new cognitive skills. Based on Piagetian (Piaget, 1950) and Vygotskian (Vygotsky, 1978)

theories, task-focused interaction among students enhances learning by creating cognitive conflicts and by exposing students to higher-quality thinking that is within their proximal zones of development (Slavin, 1987).

Social skills are definitely important. Are they as important as cognitive skills? Possibly, depending on whether you are a cognitivist or a social constructivist. If you're a social constructivist and believe, as Vygotsky wrote (Vygotsky & Cole, 1978) that all knowledge is first learned socially before being internalized, then you would have to say that maybe the social skills were more important. If you believe Vygotsky, you've got to say social skills are important; otherwise, one could not initially contact the information one is to learn.

Johnson & Johnson, (1989) have no difficulty expressing which set of skills they see as more important:

> Humans do not have a choice. We have to cooperate. Cooperation is an inescapable part of our lives. It is built into our biology and is the hallmark of our species. Cooperation is the building block of human evolution and progress. It is the heart of interpersonal relationships, families, economic systems, and legal systems. World interdependence is now a reality based on technology, economics, ecology, and politics that go beyond national boundaries and tie all countries in the world together. The management of human interdependence on a global, national, regional, organizational, community, family, and interpersonal level is one of the most pressing issues of our time. Understanding the nature of interdependent systems and how to operate effectively within them is an essential quality of future citizens. The question is not whether we will cooperate. The question is, "How well will we do it?"

Motivational theories of cooperative learning emphasize that rewarding groups on the basis of the individual learning of all group members creates peer norms and sanctions learning achievement related efforts and active helping of peers (Slavin, 1987).

Team-based learning encompasses all three of the above types of learning. The organization of the teams is around problem solving (instrumental learning); but specifically, the team tasks all involve coming to a consensus among several choices regarding the "best" choice. This restriction forces communicative learning. Students must discuss subject matter at depth, promoting their own choice or coming to understand others' choices. And in the process students are freed of prior misconceptions (Michaelsen, 1973).

A generalization about small group projects is useful to distinguish between them and team-based learning. Many small group projects involve a group of students getting together for the purpose of researching a topic and putting together a presentation about that topic for the rest of a class. What generally happens in these small groups is students meet outside of class, agree on a plan of action, divide the work into more or less even parts, with some doing the research, some designing and building the presentation, and some making the presentation. However the tasks are divided, the salient feature of this type of work is the dividing up of tasks so that individuals may complete their constituent parts alone. This division of labor is expedient because it avoids the conflict and friction involved with actually working together, and also deals effectively with scheduling and other logistic considerations.

Team-based learning has a different philosophy about group work. In team-based learning group work is done together exclusively. Tasks are constructed that require group members to consider different possibilities and then come to a consensus decision about the "right" answer. Activities can be engaged in which do not necessarily have a "right" or "wrong" answer; however, the salient requirement is for a consensus decision.

This requirement for consensus decisions forces groups to argue the pros and cons of whatever choice is advocated. This forced conflict promotes deeper learning and the development of social skills (Slavin, 1995).

Chapter 3 Methods

RESEARCH SETTING AND CONTEXT

During the spring semester of academic year 2006, two classrooms consisting of 120 students, all using an abbreviated form of team-based learning, which for the purposes of this study is being called *team-based testing*, were observed to determine which of several factors (Social Self-Efficacy, Self Monitoring, Self Construal, W(ant)C(ommitment)D(esire) Motivation, Intrinsic Motivation, Identified Motivation, Extrinsic Motivation, Introjected Motivation, Epistemological Beliefs, Instrumentality, Expressiveness) might best predict successful group performance. For this study, successful group performance was defined as high team scores on quizzes and tests.

RESEARCH DESIGN

This study was a correlation study of successful team performance and scores on the instrument and measurement of face-to-face teamwork in a collaborative learning college setting.

Correlation studies help establish covariation of the variables of interest but do not infer causality. For correlational studies conducted in field settings, Tunnell (1977) stated that researchers should strive for the most natural setting because personality characteristics and variables cannot be manipulated for ethical reasons.

Field settings allow the researcher to observe natural behavior while people are engaged in their normal activities; thus, results may be more generalizable to other everyday, nonlaboratory settings.

Self-report measures are used when variables are not directly observable. Self-report allows researchers to study attitudes, personal characteristics, attributions, or what is not externally observable at a certain point in time. Usually individuals are asked to indicate their behaviors or position on a scale.

External observation can be combined with self-report to extend the comprehension of a phenomenon. Participants may not be able to self-describe accurately or may be motivated not to reveal their true attitudes, behaviors, or characteristics. The validity of self-report is uncertain unless external observers or reliable raters confirm the self-report measures. The accuracy of surveys depends on the accuracy of respondents' answers, and researchers have found considerable evidence that the method of data collection affects the answers obtained (Tourangeau, Rips & Rasinski, 2000, p. 312).

The observation data collected with the recordings of the initial and final group interactions were used to enrich the interpretation of the self-report data gathered on the questionnaire.

In this study, students were assigned to teams by the instructor based on gender, ethnic identity, and previous exposure to the subject matter, information collected from the students during the first week of class. Teams consisted of five to seven members. The psychological trait data reported later do not necessarily reflect the actual size of the teams because absences led to missing data. In some of the analyses, it appears there were teams of four members; however this is not the case. The teams were formed along the lines suggested by Michaelsen et al (2002), who suggested that teams smaller than five or larger than seven members should be avoided. Performance data collected reflect nine teams of seven, eight teams of six, and one team of five students.

SELECTION OF OBSERVATION TEAMS

Because the research being conducted involved observing teams as well as recording the team interactions, all participants completed a consent form that gave them the option of being recorded or not. After teams were formed, any team that had individuals not consenting to be recorded was automatically disqualified from data analysis. The teams that were observed and recorded were those teams on which all members had consented to being observed and recorded.

UNIT OF ANALYSIS

Research questions in this study were examined from the perspective of what impact does the individual have on the team. In order to answer these questions, team scores were examined as well as individual scores. The different types of scores were then examined for relationships between the two.

RESEARCH PROCEDURES

Course Descriptions

Participants were drawn from two separate undergraduate courses taught in the Educational Psychology department of a large southwestern university in the spring semester of 2006. One course, Applied Learning and Development (ALD 320), is an introductory educational psychology course designed for individuals whose careers will include teaching. Theories of cognition, learning, and motivation are studied with an emphasis on classroom applications. The other course, Introduction to Statistics (EDP 371), is designed to enable students to learn basic statistical procedures frequently used in the research literature so that they will be able to (a) conduct and interpret these analyses,

and (b) intelligently and critically read the literature. The main difference between the courses is the calculation component of the statistics course. However, there were qualitative differences observed between the two courses. The students in the statistics course seemed to take the course more seriously than those in the ALD course.

Participant Characteristics and Assignment to Teams

Volunteer participants were recruited from two large campus-wide undergraduate courses. All participants completed a consent form which gave them the option of being recorded or not. After teams were formed, any team which had individuals not consenting to be recorded was automatically disqualified from data analysis. The teams selected were those in which all members consented to being observed and recorded. The data-collection process was conducted according to The University of Texas at Austin Protection of Human Subjects procedures and the Informed Consent Form.

Sampling Design and Procedures

The research participants, drawn from the specific population most pertinent to the study, came from undergraduate college students in a major public university. The study participants were not a random sample of university students, but the students were members of a particularly large class with representation from many colleges on campus. A convenience sample was used. The undergraduate-level courses used in this study provided a semester-long implementation of team-based learning to students and were a unique opportunity to study teamwork with several teams. Although random selection was not achieved in this study, the research participants may represent the larger group from which they were drawn, given the large number of students participating in the

course. It was expected that the demographic characteristics within each team were representative of the characteristics represented in the course where the teams were studied.

EDP 371

The gender distribution of the sample for the statistics course was 71% female and 23% male with the remainder undeclared. Ethnicity distribution of the sample was 21% Asian or Pacific Islander, 5% Black American, 19% Hispanic, 3% Multi-racial, 52% White, and the remainder undeclared. The sample's age distribution was: 76% 18-21 years, 18% 22-25 years, 5% 30 and over years, with the remainder undeclared. See Appendix C for tabular presentation of data.

ALD 320

The gender distribution of the sample for the ALD course was 76% female and 22% male with the remainder undeclared. Ethnicity distribution of the sample was 10% Asian, 15% Black American, 15% Hispanic, 7% Multi-racial, 51% White, and the remainder undeclared. The sample's age distribution was: 71% 18-21 years, 24% 22-25 years, 2% 26-29 years, with the remainder undeclared.

Team building process

Team-based testing, based on team-based learning procedures described in Michaelsen et al (2002), does not include team-building exercises or the teaching of group process skills. The team-based learning position is that by properly structuring group tasks to promote members' interdependence and responsibility, members learn

about fellow members and effective ways to interact without explicitly teaching these skills.

Data Collection Procedures

The study searched for evidence of reliable predictors of successful team participation. All students in the two classes were asked to fill out a questionnaire in a class session. Two teams each in two classes were observed and recorded. Each team was assigned an ID number and students entered their University Electronic Identification (UEID) that, combined with their team number, served as their identification for the study. Data were collected for statistical analyses with the team as the unit of analysis from demographic data to self-assessment of personal characteristics; observations of group work by researchers, and analysis of transcripts of voice recordings of group work.

Appendix A provides a sample of the personality factors instrument.

DATA ANALYSIS PROCEDURES

Successful and unsuccessful groups were defined by comparison. The dependent variable, overall team scores, and the independent variables, i.e., the scores on each of the constructs measured with the instrument, individual quiz and test total, and team games total, were then analyzed, using SPSS statistical package, as a multiple regression. The variables were first correlated and those variables with the highest correlation with overall team score were entered into a regression equation to find the best predictor(s) of overall team score. Also, because the instrument data were collected using 7-point Likert-type scales, these were treated as interval data. The size of the beta coefficients

determined the rank of the constructs in importance to predicting team grade, with larger coefficients indicating more predictive factors (Miles & Shevlin, 2001).

INSTRUMENTS

The personality factors instrument, see Appendix A, was constructed for this study from several different sources. The items measure twelve different constructs detailed in the following sections. In order to establish psychometric data for the instrument, Cronbach alphas (α) were calculated for each of the subscales. It was decided that constructs not achieving a Cronbach of at least .70 would not be used. The alphas were calculated using the instrument data collected from a separate group of 118 subjects obtained for this purpose from the undergraduate subject pool of the same department offering the courses studied. These 118 subjects were not otherwise part of this study, i.e., they were not participating in the cooperative learning group classes; therefore, their responses to the questionnaire was not tainted by the intervention being studied here.

Instrument Fatigue

It was feared the 107-item instrument might be so long as to cause instrument fatigue. In order that this possibility could be monitored, the content of the instrument was reversed to make another version of the instrument. The two versions were mixed together and administered randomly to participants in both classes. A MANOVA comparing Versions A and B (see Table 3.1 following) on all of the constructs revealed significant differences on only two constructs: Forms A and B differed at the .02 level on self-focused social self-efficacy and at the .04 level for epistemological beliefs. Because social self-efficacy was the first construct to appear on form A and the last to appear on

form B, any differences on this construct could possibly be explained by instrument fatigue. Likewise, the Epistemological beliefs subscale appears second to the last on version A and second from the first on version B. The presence of significant differences between versions on the first and second subscales suggests that in fact instrument fatigue was a factor. However, because there were no significant differences between high- and low-performing teams nor between classes on either of these variables, any effects of the instrument fatigue are unknown.

Table 3.1 Comparison of Instrument Forms A and B

		N
FORM	a	54
	b	49

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	SSE	2.879	1	2.879	3.719	.057
	SELF	**4.123**	**1**	**4.123**	**5.464**	**.021**
	OTHER	1.059	1	1.059	.885	.349
	LOWSM	4.440E-02	1	4.440E-02	.103	.749
	HISM	.744	1	.744	1.097	.297
	SC	2.629	1	2.629	2.356	.128
	WCDMOT	.575	1	.575	1.848	.177
	INTRIN	1.396	1	1.396	.710	.401
	ID	.750	1	.750	.560	.456
	EXT	4.713	1	4.713	1.924	.168
	INTROJ	.594	1	.594	.550	.460
	EPIST	**2.501**	**1**	**2.501**	**4.162**	**.044**
	INST	1.795	1	1.795	3.625	.060
	EXP	1.246	1	1.246	1.495	.224
	STDHRS	6.752	1	6.752	1.274	.262

Self-perceived social self-efficacy (items 1-9 α=.86)

Intuitively, social self-efficacy seems an important construct when examining group performance. Empirically, low self-perceived social self-efficacy has been found to affect social behavior (Alden, Teschuk, and Tee, 1992; Carver and Scheier, 1986; Schlenker and Leary, 1982). Individuals high in public self-consciousness have been shown to be especially aware of others' reactions to them, to view others' behavior as having personal relevance, and to be sensitive to interpersonal evaluations (Fenigstein, 1979). All of these cognitive tendencies would be expected to contribute to negative affect and avoidance in social situations. A large body of research has demonstrated that efficacy expectations by themselves predict many aspects of behavior in potentially fear-arousing situations (Bandura, 1986).

Research in a social context (Alden, Teschuk, and Tee, 1992) has shown self-aware, low-efficacy participants, as compared to non-self-aware participants as well as to high-efficacy participants, to be more self-focused, spend more time focused on self, engage in more frequent self-evaluation, to be more self-conscious, more concerned with the impression they made on others, and felt they had made a worse impression on others. Additionally, self-aware, low-efficacy participants withdrew from interactions more quickly and believed others found them less likeable. Participants' ratings were confirmed by their partners. Partners in a social interaction found these low-efficacy participants handled social situations less well and were less likeable. This research seems to show that participants low in social self-efficacy handicap themselves in social situations by spending an inordinate amount of time thinking about themselves. In itself, this fact alone gives them fewer cognitive resources for processing other material,

including whatever topic is being discussed in the social situation. However, this is not the only negative consequence of this obsession with self. This preoccupation with self, self-evaluation, and inordinate concern with others' assessment of self results in negative reactions from partners, thus further hampering group function.

For all the forgoing reasons it seemed self-perceived social self-efficacy was an important personality factor to examine when looking at learning group participation. One would reasonably expect that subjects low in social self-efficacy would perform less well in learning groups than those higher in social self-efficacy.

Expectations/desire/commitment/optimism (items 10-28 α =.76)

These 19 items were selected from a 38-item scale used in a previous motivation research study. That research, based on the work of Wicker et al. (2004) examined the change in levels of motivation and optimism of undergraduate introductory statistics students over the course of a semester. Analysis of these data found significant effects for the 19 items re-used here. Due to the effects found for these items, it seemed reasonable to use them to differentiate between students in learning groups.

Self monitoring (items 29-53 α =.76)

Snyder (1974) defines the self-monitor as one who, out of a concern for social appropriateness, is particularly sensitive to the expression and self-presentation of others in social situations and uses these cues as guidelines for monitoring her own self-presentation. High scores on the Self-Monitoring Scale (SM) indicate regulation of one's behavior on the basis of external situations, such as how other people react and low scores indicate regulation of one's behavior on the basis of internal factors, such as

beliefs, attitudes, and values. The SM scale measures individual differences in observing and controlling expressive behavior and self-presentation. Individuals scoring high on this scale are sensitive to the expression and self-presentation of others in social situations and use these cues for monitoring and managing their own self-presentation and expressive behavior. The individual scoring low seems to be more directed by inner feelings or past experience than by concern for social appropriateness as defined by others or the situation.

Snyder (1974) tested the Self-Monitoring Scale (SM) extensively for reliability and validity. The entire scale is included so the following psychometric data are applicable. The SM has a Kuder-Richardson 20 reliability of .70 and a test-retest reliability of .83 after 1 month. Cross-validation on an independent sample yielded a Kuder-Richardson 20 reliability of .63. The correlation between the SM and the Marlowe-Crowne Social Desirability Scale is r = -.1874. There is also a similar low negative correlation with the Minnesota Multiphasic Personality Psychopathic Deviate scale (r = -.2002). Peer ratings and self-ratings were highly correlated, r = .45.

The construct of self-monitoring seems particularly salient when looking for predictors of successful learning group participation. When people are uncertain of their emotional reactions they look to the behavior of others for cues to define their emotional states (Schachter & Singer, 1962). Snyder (1974) postulated the goals of self-monitoring to be: accurate communication of one's true emotional state, accurate communication of an arbitrary emotion, concealment of inappropriate emotions, appearing to experience appropriate emotions, and appearing to be experiencing an emotion when one is in fact

experiencing nothing. It is apparent the preceding skills are helpful, if not outright necessities, for group interaction.

Self-construal (items 54-57 α =.42)

Self-construal concerns what people believe about the relationship between the self and others and, especially, the degree to which they see themselves as separate from others or as connected with others (Markus & Kitayama, 1991).

Markus and Kitayama suggested that investigation of phenomena such as social facilitation or social loafing could also produce differential effects, depending on the self-systems of the subjects. They asked: "Should those with interdependent construals of the self show pronounced social facilitation compared with those with individual selves? Or should those with interdependent selves be less susceptible to social loafing (decrements in performance when one's individual contribution to the group product cannot be identified; see Harkins, Latane, & Williams, 1980)?"(p. 247).

One question of interest is: Will students with different cultural backgrounds perform differently as members of groups? One might predict those from more interdependent cultures will perform better in groups than those from more independent cultures. However, since all students join the groups as virtual strangers, one might assume that the salient differences between those from different cultures may be attitudinal in that those from interdependent cultures might be more likely to expect a rewarding experience than those from independent cultures.

Intrinsic/extrinsic motivation (items 58-72 α =.80)

Ryan and Deci's (2000) Self-Determination Theory presents another perspective from which to view learning group participation. Expanding upon the traditional intrinsic/extrinsic motivational dichotomy, Ryan and Deci described four different levels of extrinsic motivation. On a continuum from external to internal, these forms of extrinsic motivation are: (a) External regulation, based solely on external incentives or disincentive, (b) Introjection, where ego and approval from others become involved, (c) Identification, in which the activity becomes consciously valued and endorsed; and (d) Integration, in which the reasons for an action become "fully assimilated to the self" (p. 62). Integration is the point where reasons for action are fully "congruent" with one's own values and needs, yet it still differs from intrinsic motivation in that the task remains pursued for its instrumental value, not simply because it is "interesting."

One might say that students participating in ongoing group learning are moving from a purely External form of extrinsic motivation ("this is going to be on the test") to an Introjected form, where the student begins to care about the approval of others ("I don't want to let my team down"). Competition between groups has been shown to increase within-group cohesiveness (Shaw, 1981) and some instructors encourage competition between teams to promote further motivational internalization. This competition between teams might be assumed to help move students from Introjection ("I don't want to let my team down") to Identification ("I want to beat Team Two—we can do it!").

The specific items on the scale are adapted from Ryan and Connell (1989). They found that the four types of regulation lie along a continuum of autonomy. Differences in

attitudes and adjustment were associated with the different types of extrinsic motivation. The more students were externally regulated the less they showed interest, value, or effort, and the more they indicated a tendency to blame others, such as the teacher, for negative outcomes. Introjected regulation was positively related to expending effort, but was also related to more anxiety and to poorer coping with failures. Identified regulation was associated with greater enjoyment of school and more positive coping styles. And intrinsic motivation was correlated with interest, enjoyment, felt competence, and positive coping.

It seemed likely that these gradations of motivation would have an impact on the learning groups to be studied here. Whether this impact would be more obvious in the group processes being observed or in the quantitative outcomes being measured was unclear; however, the following research supporting the above findings led me to expect relationships between type of motivation and both processes and outcomes. More autonomous extrinsic motivation is associated with greater engagement (Connell & Wellborn, 1990), better performance (Miserandino, 1996), less dropping out (Vallerand & Bissonnette, 1992), higher quality learning (Grolnick & Ryan, 1987), and greater psychological well-being (Sheldon & Kasser, 1995).

Epistemological Beliefs (items 73-83 α =.69)

Epistemological beliefs are defined as beliefs about knowing and learning that reflect views on what knowledge is, how it is gained, and the limits and criteria for determining knowledge (Thorndyke, 1981). Epistemological beliefs consist of an

individual's beliefs about the certainty of knowledge, the organization of knowledge, and the controls an individual has over knowledge (Schommer-Aikins & Hutter, 2002).

A person holding naive epistemological beliefs generally believes that: knowledge is simple, clear and specific; knowledge resides in authorities and is therefore unchanging; concepts are learned quickly or not at all; and learning ability is innate. In contrast, a person holding sophisticated epistemological beliefs generally believes that: knowledge is complex and uncertain; knowledge can be learned gradually through reasoning processes; and knowledge can be constructed by the learner (Schommer, 1990).

Epistemological beliefs help explain how, and how effectively, students process information, interpret knowledge, and monitor their learning (Hofer & Pintrich, 1997; Schommer, 1994). Students with more mature beliefs are said to be more sophisticated about knowledge acquisition and learning. Students with more sophisticated epistemological beliefs comprehend information better, are more able to handle complex problems, and are more likely to use strategies that lead to higher academic achievement than less sophisticated students (Schommer, 1994).

If epistemological belief is this predictive of individual achievement, it seems likely there would be a similar close relationship between epistemological belief and successful learning group participation. One would assume a positive correlation, that is, the more mature or sophisticated one's epistemological beliefs are, the more successful one is likely to be as a member of a learning group.

Instrumentality/Expressiveness (items 84-107 α =.74/.83)

This subscale was used because the literature makes it clear there are significant differences between men and women on this scale. I hoped to find a significant relationship between degree of instrumentality/expressiveness and successful group participation.

These 24 items come from the Personal Attributes Questionnaire (PAQ) (Spence et al., 1975), used as a revised (Lenney, 1991) self-report assessment measure of instrumentality and expressiveness and built on a 7-point Likert-type scale. Items are presented as words or phrases, and respondents are asked to rate the extent to which each item is descriptive of themselves, using 7-point interval scales, from 1 = never true of me to 7 = always true of me. Cronbach alpha reliability coefficients showed adequate levels of internal consistency (men = .83, women =.77).

Instrumentality items presented in the M scale were found to refer largely to instrumental, agentic characteristics. The adjectives and phrases that describe masculinity are independent, active, competitive, can make decisions easily, never give up easily, self-confident, superior, and stand up well under pressure. High scores are indicative of greater self-perceived agency. For the factor of instrumentality/masculinity, scores of 1 represent lower instrumentality; scores of 7 represent higher instrumentality. From the scores of the questions a mean was calculated.

Expressiveness/femininity items presented in the F scale were similarly defined as socially desirable characteristics that refer largely to expressive, communal attributes. High scores are indicative of greater self-perceived communion. The adjectives and phrases that describe femininity are emotional, able to devote self completely to others,

gentle, helpful to others, kind, aware of feelings of others, understanding of others, and warm in relations with others. Scores of 1 represent lower expressiveness; scores of 7 represent higher expressiveness. From the scores of the questions a mean was calculated.

PROCEDURES FOR PROTECTION OF HUMAN SUBJECTS

In order to protect the students' voluntary participation, neither the Teaching Assistants nor the Instructor knew whether or which subjects answered the questionnaires nor were they be privy to any of the observations, recordings, or transcriptions of any of the group processes until after the course was completed and grades were submitted.

Chapter 4 Results

The purpose of the current study was to determine predictors and describe the make-up of high- and low-performing learning teams, and determine what individual differences might affect team performance but not necessarily show up on other measures. To this end, two undergraduate classes employing an implementation of team-based learning were observed. The two classes were an introduction to statistics class and an educational psychology class. There were a total of 117 students, 103 of whom completed the questionnaire. Both classes, taught by the same instructor, were structured virtually identically with six quizzes worth 15 points each and three tests worth 60 points each administered over the course of the semester. Each quiz and test was first administered individually, then teams assembled and completed the quiz or test collectively. The nine individual quiz and test scores were summed for each participant. Additionally, team scores were summed for each individual. These individual team scores were then averaged for each team and this score was used as the team score. Self – report data were collected using the instrument described previously. The instrument solicited data using a Likert-type scale for 12 different personality constructs.

Prior to the current study, the self-report questionnaire was administered to a sample of 118 undergraduates enrolled in additional sections of the introduction to statistics course. The data were analyzed for reliability. Cronbach alphas were computed for each of the 12 constructs. The results of this reliability analysis appear in the table following. A decision was made that constructs with Cronbach alphas less than .70 would not be used for further analyses.

Table 4.1 Pilot Study Data Reliability

Construct	*Number of Cases* *	*Number of Items*	*Cronbach Alpha*
Social Self-Efficacy	118	9	.86
High Self Monitoring	118	13	.76
W(ant)C(ommitment)D(esire) Motivation	118	17	.76
Intrinsic Motivation	118	4	.80
Identified Motivation	118	6	.84
Instrumentality	118	8	.74
Expressiveness	118	8	.83

* Number of cases varies due to missing data

The data for the current study were also analyzed for reliability and the results of that analysis appear in the following table.

Table 4.2 Current Study Data Reliability

Construct	*Number of Cases* *	*Number of Items*	*Cronbach Alpha*
Social Self-Efficacy	101	9	.89
High Self Monitoring	99	13	.79
W(ant)C(ommitment)D(esire) Motivation	97	17	.72
Intrinsic Motivation	101	4	.89
Identified Motivation	101	6	.85
Epistemological Beliefs	101	11	.76
Expressiveness	100	8	.85

* Number of cases varies due to missing data

RESEARCH QUESTION 1: WHAT ARE THE PREDICTORS OF LOW- AND HIGH-PERFORMING LEARNING TEAMS?

Once it was determined that the measures were reliable, correlations were conducted to determine statistically significant measures to be used in a regression analysis. In addition to the above measures, individual average scores on the total number of quizzes and tests, average team scores for the same quizzes and tests, and total team games points for each individual were correlated with the other measures. Team games were conducted five times during the semester. These "games" were generally reading comprehension tests to determine whether students had read the assigned readings. Different from the quizzes and tests, these exercises were conducted by teams only, not by individuals first. Scores ranged from 0 to 24 with highest-performing teams receiving the most points and lowest-performing teams receiving the fewest. The biggest differences in cumulative points occurred as the result of absences; so this measure was to some extent a measure of motivation (i.e., the commitment to be present for class). The table following shows the correlations between team scores, individual scores, and team games scores.

For this study high- and low-performing teams were defined relative to highest team score in each class. Team scores were calculated by averaging all members of a team's scores on team tests and team quizzes. Since the one class outperformed the other class, it seemed misleading to define high- and low-performance by the same criteria for both classes; therefore, high-performance was defined as those scores that fell within 95% of the top score in each class.

Table 4.3 Correlations

		Games Total	*Team Avg*	*Individual Avg*
Games Total	Pearson Correlation	1.000	.419**	.024
	Sig. (2-tailed)	.	.000	.813
	N	101	101	101
Team Avg	Pearson Correlation	.419**	1.000	.309**
	Sig. (2-tailed)	.000	.	.002
	N	101	102	102
Individual Avg	Pearson Correlation	.024	.309**	1.000
	Sig. (2-tailed)	.813	.002	.
	N	101	102	103

** Correlation is significant at the 0.01 level (2-tailed).
A complete table of correlations can be found in Appendix B.

The variables which were significantly correlated with average team scores were then entered sequentially into a regression equation to determine which variable, or group of variables, would most reliably predict high-performing teams. The tables following present the results of the regression analysis.

Table 4.4 Regression Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	.419	.175	.167	.7655
2	.509	.260	.244	.7292

a Predictors: (Constant), Games Total
b Predictors: (Constant), Games Total, Individual Average

Table 4.5 Regression Model ANOVA

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	12.348	1	12.348	21.070	<.000
	Residual	58.020	99	.586		
	Total	70.368	100			
2	Regression	18.265	2	9.133	17.177	<.000
	Residual	52.103	98	.532		
	Total	70.368	100			

a Predictors: (Constant), Games Total
b Predictors: (Constant), Games Total, Individual Average
c Dependent Variable: Team Average

Table 4.6 Regression Model Coefficients

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients			Correlations		
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part
1	(Constant)	27.237	.206		131.918	<.000			
	gamestot	.056	.012	.419	4.590	<.000	.419	.419	.419
2	(Constant)	25.348	.600		42.274	<.000			
	gamestot	.055	.012	.412	4.738	<.000	.419	.432	.412
	ind_avg	.084	.025	.290	3.336	<.001	.300	.319	.290

a Dependent Variable: Team Average

As one can see in the model summary table, games total predicted team average better than individual average did. However, when combined, both variables predicted team average better than games total alone as one can determine by the increased R square, the measurement of how much of the variation is accounted for by the model. The ANOVA table also shows the two-variable predictor model accounting for more of the variance and leaving less residual variance while still reaching a significance level greater than .000. As one sees in the coefficients table, games total has a much larger beta coefficient (.412) than individual average (.290) but together they do a better job of predicting team average than either one alone.

These results might be considered surprising from a team-based learning perspective. The team-based learning literature would have us believe that the team-building process is a complicated one, wherein the noisy member with the wrong answers

is quieted, the quiet member with the right answers is empowered, members teach the material to other members, and the whole of the team is uplifted in a democratic, cooperative learning process. These results seem to support a much simpler picture of team-based learning. If a team includes a high-performing individual member, a "superstar" who attends class regularly, the team scores higher than those teams with lower-performing individuals and less regular attendance. Additionally, the highest-performing member of high-performing teams, the "superstar", outdistanced the nearest competitor by a wider margin on high-performing teams than on low-performing teams. So it appears that one reason high-performing teams outperformed low-performing teams was the performance of a single individual, or "superstar", on the high-performing teams.

This "superstar" effect seems to be closely related to the "rich get richer" or "Matthew" effect described elsewhere. Onwuegbuzie, Collins, & Elbedour (2002) found that "…groups that contained high-achieving students on an individual level tended to produce better group outcomes than did their low-achieving counterparts."

RESEARCH QUESTION 2: ARE THERE DIFFERENCES IN THE COMPOSITION OF HIGH- VERSUS LOW-PERFORMING TEAMS?

To answer this question, techniques from Exploratory Data Analysis (EDA) were used (Tukey, 1977). Data were graphed to see if there were obvious visual differences between data for different teams. Initially, line graphs were constructed for each team with each of the different measures appearing as a separate line; however, these graphs contained so much information that the observer was overwhelmed and hard-pressed to perceive all the data, much less perceive differences between teams. Next, measures were

bar-graphed individually by team so that there were 18 graphs of social self-efficacy, 18 graphs of individual performance, etc. Graphs were examined, comparing high-performing teams to low-performing teams. Mean difference scores and standard deviations were calculated for each team and each measure. Tabular presentation of these data appears in Appendix C.

It was expected there would be some obvious differences between high-performing and low-performing teams, and upon observation of the graphs there did appear to be differences; however, when t tests were conducted to determine if the differences were significant, in virtually all cases, the differences were not statistically significant. See table 4.7 following.

Table 4.7 Test of Homogeneity of Variances

	Levene Statistic	***df1***	***df2***	***Sig.***
Self-perceived Self Efficacy	.014	1	101	<.905
High Self-Monitoring	2.473	1	101	<.119
Want/Commitment/Desire Motivation	.098	1	101	<.755
Intrinsic	.386	1	101	<.536
Identified	1.214	1	101	<.273
Instrumentality	.433	1	101	<.512
Expressiveness	.115	1	101	<.736
Study Hours	.137	1	101	<.712
Individual Average	.825	1	101	<.366

A MANOVA revealed that the variance within teams was much greater than the variance between teams. To determine whether the differences in variance within teams was significant, ANOVAs along with Levene's test of equality of error variances, which tests the null hypothesis that the error variance of the dependent variable is equal across groups, were conducted for each construct using the construct as the dependent variable

and high/low team performance as the fixed factor. In fact, for all measures the error variance of the dependent variables was equal across groups.

Next, based on Johnson and Johnson's (1996) work, I sought to determine whether high-performing teams embodied American values such as interdependence, joint effort, and mutual responsibility more than low-performing teams. Johnson and Johnson have argued that success in cooperative groups results from joint efforts. Watson et al (1993) said that through the team-based learning process, a group of individuals becomes a team; that is, they become not just the sum of members' performance, rather, the group dynamics produce something above and beyond the sum of individual performances. It was hypothesized that high team performance was the result of the individuals within a team being elevated by the process to a higher level of performance than would be possible for individuals. Low-performing teams, on the other hand, would have more widely varying scores, evidence that they were no more than a collection of individuals.

The result of comparisons of low- and high-performing teams' individual performance scores did not support the above hypothesis. Low- and high-performing teams differed significantly on individual performance. In particular, the lowest individual scores were up to 25% lower from the highest scores for high-performing teams while for low-performing teams, lowest individual scores were within 20% or less of the highest scores. Another difference between low- and high-performing teams was the nearness of the next highest individual performer to the highest individual performer. On all low-performing teams except two, the next highest performer's score was within

96% of the top performer'; whereas on half of high-performing teams, the next highest performer's score was only 93% or less of the top performer's score.

This paints a much different picture of team-based learning than expected. Rather than the joint effort and mutual responsibility, the homogeneous, democratic group who are all uplifted through the process of cooperation and collaboration, it appears that high-performing teams are dominated by a single "superstar." Not only did lower-performing groups have the smaller range of individual scores, they also had the smaller distance between the top-performer and the next highest performer. This would seem to support the superstar over the one for all and all for one hypothesis. Observations of groups also seem to support this hypothesis. Rather than the group process fostering democracy and egalitarianism, what seemed to happen was the superstar became the main contributor and dominator of his or her team. See, for example, the following transcripts:

Late in the semester, Student 4 is the "superstar" with the highest cumulative individual total. The following discussion occurred late in the class after some discussion where Student 4 has made a point of citing the text in support of her answer.

Student 4: I would go with E.

Student 3: OK

Student 5: That's fine.

Here are two cases: one where Student 4 is correct and one where she is incorrect. In both cases Student 4 suggests the answer and other members agree with her.

Student 4: Eight, uh D? I remember that from the previous something or other.

Student 1: D

Student 5: Yeah, me too.

Student 4: I was like, "oh, wait"

Student 5: I think it was on the quiz

Student 4: Yeah, I am pretty sure it was, too. So. . . [scratching] Correct.

Student 4: I would go with E.

Student 3: OK

Student 5: That's fine.

Student 4: OK, so this is the one where it doesn't, doesn't have a, um. . .

Student 6: Oh. . . darn!

Here again, Student 4, in control of the answer sheet, suggests an answer, there is some small debate, Student 4 minimally supports her point, decides debate is over and scratches off her choice with no protest.

Student 4: I think C makes the most sense

Student 1: I guessed C but then I erased it and put D, for some reason.

Student 2: I put A, but I was like. . .

Student 4: I was between B and C.

Student 2: A or C.

Student 5: I just couldn't remember what A, B or C were

[everyone is talking at once]

Student 3: The reciprocal

Student 4: The reciprocal was like "reading" was like the model questions

Student 5: I thought C was like the teacher and. . .

Student 2: Yeah

Student 4: It helps you think, basically. Like. . . I think that makes the most sense.

Student 3: Questioning, clarifying, prediction. . . wasn't it all that stuff?

Student 5: Oh, OK.

Student 4: Yeah. So, C, nineteen [scratching] correct.

RESEARCH QUESTION 3: ARE THERE ADDITIONAL DIFFERENCES BETWEEN HIGH- AND LOW-PERFORMING TEAMS NOT ACCOUNTED FOR BY PREVIOUS ANALYSES?

It was hypothesized that individual differences might affect the group process but not necessarily show up in the other analyses. In order to determine whether individuals on high- and low-performing teams differed on individual questionnaire items, an ANOVA was conducted using high- and low-performing teams as the fixed factor and the 107 individual questionnaire items as dependent variables.

It is recognized that an analysis involving individual items does not make a very strong case that the high and low teams differ significantly; however, identifying differences may provide insight into future research.

Individuals in high- and low-performing groups differed significantly (.01 - .10 level) on 12 of the 107 items on the questionnaire. Five of the items were motivation items, three self-monitoring items, two epistemology items, one instrumentality item, and one of the filler questions on the instrumentality/expressiveness subscale.

Motivation Items

Individuals differed on 5 separate motivation items (see Table 4.8 following) and the Cronbach Alpha computed for the 5 equals .63. This supports an argument that the 5 items may be part of a larger whole. This lends some credence to the assertion that low-

and high-performing individuals differed significantly with respect to their motivation. Low-performers said they wanted to make a good grade more than high-performers, would feel worse than high-performers if they fell just short of their goal or missed it by a significant amount, would put more effort into studying, and wanted more to feel like they were helping their classmates. Intuitively, one would expect the means for high-performers and low-performers to be just the reverse of what they are.

Table 4.8 Motivation Items

Item	*Means*		*Standard Deviation*	*Cronbach Alpha*	*Significance*
10. How much do you **want** to make a good grade in this course?	0 1	6.8 6.5	.47 .74	.63	<.05
17. Imagine you just now found out that you fell just short of making a good grade in this course (e.g., a B if you define a good grade as an A). How bad would you feel?	0 1	5.3 4.5	1.8 1.8		<.03
18. Imagine you just now found out that you made a **C** or lower in this course. How bad would you feel?	0 1	5.5 4.6	2.4 2.7		<.07
20. If you were studying for this course right now, would you put a lot of effort into studying?	0 1	6 5.5	1.0 1.3		<.04
66. I want to feel like I am helping my classmates.	0 1	5.3 4.9	1.3 1.6		<.10

Self-monitoring Items

For the self-monitoring items, there was a significant difference between high and low teams on 1 low self-monitoring item (32) and 2 high self-monitoring items (38, 44).

This may explain why the Cronbach alpha (.28) was not higher for the 3 items. As with the motivation items, one might expect the means to be the reverse of what they actually are, as described in the table following,

Table 4.9 Self-monitoring items

Item	*Means*		*Standard Deviation*	*Cronbach Alpha*	*Significance*
32. I can only argue for ideas which I already believe.	0 1	3.3 4.4	1.7 1.7	.28	<.001
38. I sometimes appear to others to be experiencing deeper emotions than I actually am.	0 1	4.9 4.2	2.1 2.4		<.09
44. I'm not always the person I appear to be.	0 1	4.6 4.0	1.5 1.9		<.06

Epistemological Belief Items

The difference between low- and high-performers on these 2 epistemological belief items is just as one might expect. The less-advanced, more concrete answers in both cases belong to low performers.

Table 4.10 Epistemological belief items

Item	*Means*		*Standard Deviation*	*Cronbach Alpha*	*Significance*
76. Too many theories just complicate things.	0 1	3.6 2.9	1.6 1.5	.58	<.02
80. There is nothing more annoying than a question that has more than one answer.	0 1	4.3 3.3	2.0 1.8		<.01

Instrumentality Item

Also telling is the difference between low- and high-performers on this measure of instrumentality. If one assumes a trait of cooperative groups is cooperation, then the low performers' self-identification as competitive might be a contributing factor to their lower performance.

Table 4.11 Instrumentality item

Item	***Means***	***Standard Deviation***	***Cronbach Alpha***	***Significance***
How true is each phrase or word of you?				
93. Competitive	0 5.4 1 4.8	1.3 1.5	N/A	<.04

Chapter 5 Discussion

To recap the objective of this research, the reader is reminded of the introduction to this document, wherein it was stated by Michaelsen, Knight, & Fink (2002) that teams must be formed in such a way as to avoid establishing teams whose membership characteristics are likely to interfere with the cohesion-forming process. To this end, teams are formed by the instructor with the goal of attaining inter-team homogeneity and intra-team heterogeneity. Students are sorted by ethnicity, gender, particular background knowledge, college program, etc. Teams are formed with the goal of evenly distributing these variables among teams. In this way, as much difference as possible is included in each team, providing as much varied input as possible to team discussions. It has been found that heterogeneous teams often have a little more difficulty establishing cohesion than homogeneous teams; but, tend to catch up to, and possibly surpass homogeneous teams within a semester (Watson et al, 1993). Inter-team homogeneity ensures that teams have approximately equal resources. This is important when teams compete for extra points to avoid the problems associated with perceptions of unfair division of resources. Additionally, teams must have approximately the same talent pool to draw from in completing their assignments. In order to meet these conditions it is necessary to obtain and analyze some background information about the students who will form these teams. This study attempted to determine which of several constructs was more useful in predicting successful team process.

SUMMARY

The objective of this research was to find specific personality factors which would predict low-performing and high-performing teams with the further objective of using this information for future team formation in addition to the information currently being used for team formation. It was expected that this information would result in a more efficient method for selecting which particular individuals will perform the most effectively in which particular teams while minimizing the wasted effort and de-motivation currently experienced by members of low-performing teams.

The results of this study were that only individual performance and team games scores were significantly correlated with team performance (Pearson's $r = .31$ and .42 respectively, $p < .01$). The results of the regression analysis, i.e., that individual performance and games total, with Beta weights of .290 and .412 respectively ($p < .001$), predict team average, provides evidence that high-performing learning teams are those teams which include high-performing individuals and are composed of individuals who show up for and participate in class. Evidence was also found which suggests that, contrary to popular conceptions of cooperative learning, high-performing teams include one high-performing individual, a "superstar", whose performance is significantly higher than other members' performance. In contrast, lower-performing teams lack a "superstar" and there is less difference between team members' performance.

These results are somewhat disappointing from a psychological perspective. None of the interesting psychological constructs included in the questionnaire administered to subjects contributed significantly to the differences between low- and high-performing teams. The results are not surprising, in fact are common sense, from an educator's

perspective. High-performing students tend to perform consistently across environments; likewise, motivated, engaged students must first be present for class activities before impacting them positively.

In addition to looking for reliable predictors of high-performing learning teams, it was expected that this, admittedly limited, implementation of team-based learning would support the widely held views of Johnson and Johnson (1996), Michaelsen et al. (2002), and Watson et al. (1993) that cooperative learning nurtures the development of joint effort, mutual responsibility, and democracy. The evidence here seems to suggest that lower-performing teams are more cooperative than high-performing teams rather than the reverse which would be expected under the above assumptions. One might argue that the differences observed support the Watson et al. (1993) contention that the diversity of the team not only increases performance, it also slows the cohesiveness development process and that the higher-performing teams' cohesiveness will develop more slowly. The satisfactory answer to this argument lies in the longer-term observation of learning teams.

ADVANTAGES AND LIMITATIONS OF PRESENT STUDY.

As Johnson & Johnson (1989) have said, cooperative efforts might be expected to be more productive than competitive or individualistic efforts only under certain conditions. The conditions that seem to promote successful cooperation are clearly perceived positive interdependence, considerable face-to-face interaction, and frequent use of relevant interpersonal and small team skills. This implementation of team-based learning provided subjects with clearly perceived positive interdependence. The students understood very clearly that bonus points were available to high-performing teams. The

presence of the other two conditions, i.e., considerable face-to-face interaction, and frequent use of relevant interpersonal and small team skills is somewhat more questionable. The terms considerable and frequent as used here are problematical. There is a limited amount of time available in a semester-long undergraduate course. The total amount of time spent on team activities in these classes was approximately 10 hours and no more than 15 hours. Interpersonal and team skills were practiced to a greater or lesser extent by all team members. The task structure, wherein the team must come to consensual answers on multiple choice test items, limits the interpersonal and small team skills necessary; however, the limited team interaction time could be seen by some as an argument for the need for specific interpersonal and small team skills training.

The superstar effect observed in the higher-performing teams is not encouraging. Recall that the gap between the highest individual performers and the next highest performers on high-performing teams was larger than was this gap on the low-performing teams. This is evidence that the high-performing teams were riding the coattails of the superstar. This effect is somewhat counterbalanced by the data gathered on the games total scores. The regression demonstrated that games total scores were a better predictor of successful teams than was individual performance. The main source of variation within the games total scores was attendance; that is, when team members were absent on team games days they received scores of zero. Team average scores for games were a simple average of the present team members' scores. Even if they performed poorly their scores were generally higher than zero. Therefore, the contributions of all members of the team determined the overall team average.

One downside of the superstar phenomenon is the rich-get-richer or Matthew effect (Merton, 1968) as documented by Onwuegbuzie, Collins, and Elbedour (2003). In the 2003 study as in the present study, teams containing high performing individuals outperformed those teams with lower-performing individuals. From one perspective, the superstars can be said to be depriving their lower-performing counterparts of the opportunity to learn by taking over control of the team, thereby reaping the rewards at the expense of the other team members. On the other hand, Merton (1968) points out the up side of the rich get richer, or Matthew effect. In the world of science, the well known researcher often popularizes ideas which if put forward by a lesser-known scientist, might go unnoticed. Similarly, co-authoring a paper with a well-known scientist gets the lesser-known scientist more attention and recognition; not to mention the opportunity to work with a senior scientist in the field. Along these lines, the formation of groups with heterogeneous levels of ability is still a beneficial practice. The lower-performing individuals get bonus points awarded their team due to the superstar's performance which they would not otherwise receive. Additionally lower-performing team members are in a position to observe some part of the superstar's cognitive process by their close proximity even if the superstar is not explicitly "teaching" them. Without evidence to show that the superstar is negatively affecting the learning of the lower-performing team members, it seems rash to assume there are not positive benefits for all parties.

One remedy for social loafing, or riding the coattails of the superstar is the Jigsaw method (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978). In the jigsaw method, students are assigned to six-member teams to work on material that has been divided into sections. Each team member reads a section. Then the members of the different teams

who have read the same material get together in "expert groups" to discuss their sections. The students then return to their original groups and take turns teaching their teammates about their section. Students are motivated to listen to their teammates because that is the only way to learn the other "pieces" of the jigsaw. Students are then tested over all the material. This method not only taps the superstar's already existent superior learning talents; but, also gives the superstar the additional learning opportunity of teaching the material to her teammates. Not only is the superstar benefited; all team members are required to take more responsibility for their learning.

RECOMMENDATIONS FOR FUTURE RESEARCH

Will knowing that individual performance and commitment to the team process predict team performance assist instructors in assigning students to teams so that competition for bonus points is relatively even among all teams, resulting in maximum learning? Perhaps a future intervention study could examine whether adding the results of a pre-test of course material and the answers to a couple of questions to accurately probe commitment to the criteria already used for team assignment will allow for more even competition among teams. Future research should also examine whether assigning students to teams in such a way that minimizes the superstar effect would facilitate learning.

The differences observed on individual items between members of low- and high-performing teams suggest additional directions for future research. The differences on the five different motivation items suggest there may be important differences in motivation between high- and low-performing team members. The high positive correlation between

team games scores and individual performance also lends weight to an assumption of the importance of the role of motivation in these teams. The fact that the low-performing team members said they desired success more, would feel worse if they fell short of their goals, and wanted to feel like they were helping their classmates more than the high-performing team members might suggest the low-performing team members' emotions are more salient to them than are the high-performing members'. A significantly higher score on the expressiveness subscale used here would have supported this contention; however, that evidence was not found here. A pre/post design might determine whether low-performers did in fact feel worse about falling short of their goals than high-performers. The assessment by the low-performing team members that they would put more effort into studying than high-performing team members could suggest a range of possibilities. Low-performers may accurately recognize their need for more study. Conversely, they may be overstating their commitment to the workload of the course. Again, a series of follow-up questions probing the congruence of actual and planned studying would clarify this issue.

The differences between high- and low-performing teams on 3 separate items from the self monitoring subscale suggest the presence of differences between teams along these lines as well. One particularly interesting question for future research might be: are low performers preoccupied with how they are being perceived by others to the detriment of their performance on the academic tasks at hand? High-performers seem to be saying with their answers to item 32, arguing for ideas one already believes, that they feel compelled to present an accurate self-portrayal. Items 38 and 44 which suggest one is displaying an inaccurate self-portrayal suggest that high-performers do in fact feel more

congruent with their self-portrayals than low-performing team members. More research to determine the effect of self-monitoring behavior on team performance is needed.

Last but not least: do the epistemological beliefs of individual team members affect team performance? Both items 76 and 80 suggest that high-performing team members hold more sophisticated epistemological beliefs than low-performing team members. How exactly do these individual beliefs function through the group process to enhance team performance? Can we promote higher team performance by increasing the epistemological sophistication of individual members?

Appendix A Questionnaire

Participant Number: _____ **Team Number:** _____ Form **A**

Sex (circle one)**:** M F **Age** (circle one)**:** Below 18 18-21 22-25 26-29 30 & over

Ethnicity: (circle one): American Indian / Alaskan Native Asian or Pacific Islander

Black (not of Hispanic origin) Hispanic

White (not of Hispanic origin) Multi-racial (parents are different ethnicities)

Other (please specify): _____

For questions 1-9, circle the number that best represents your degree of confidence that you could perform the following activities successfully. [For example, 1= Not at all confident, 7= Very confident]

How **confident** are you that you could . . .

		Not at all						Very
1	. . . Start a conversation with someone you don't know very well	1	2	3	4	5	6	7
2	. . . Seek someone's advice when you are unsure	1	2	3	4	5	6	7
3	. . . Invite a person who is new to join your group of friends for an activity	1	2	3	4	5	6	7
4	. . . Express your opinion to a group of people discussing a subject that is of interest to you	1	2	3	4	5	6	7
5	. . . Get second opinions from other persons on important decisions	1	2	3	4	5	6	7
6	. . . Help to make someone you've recently met feel comfortable with a group of your friends	1	2	3	4	5	6	7

7	. . . Share with a group of people an interesting experience you once had	1	2	3	4	5	6	7
8	. . . Ask someone for help when you need it	1	2	3	4	5	6	7
9	. . . Get someone in a group who is shy to share an opinion	1	2	3	4	5	6	7

For questions 10-23, circle the number that best represents your answer to each of the following questions.

[For example, on question 5) 1= You don't want a good grade at all, 3 = You want it just a little bit but not too much, 5 = You have a moderate, intermediate amount of wanting, and 7 = You want it very much -- about as much as it is possible to want something.]

		Not at all						**Very**
10	How much do you **want** to make a good grade in this course?	1	2	3	4	5	6	7
11	How **optimistic** do you feel about your performance in this course?	1	2	3	4	5	6	7
12	Imagine you just now found out you made a good grade in this course. How good would you feel?	1	2	3	4	5	6	7
13	How **committed** are you to making a good grade in this course?	1	2	3	4	5	6	7
14	How **important** is this course to you?	1	2	3	4	5	6	7
15	How much do you **desire** to make a good grade in this course?	1	2	3	4	5	6	7
16	Do you expect much **competition** from other students in the course?	1	2	3	4	5	6	7

17	Imagine you just now found out that you fell <u>just short</u> of making a good grade in this course (e.g., a B if you define a good grade as an A). How bad would you feel?	1	2	3	4	5	6	7
18	Imagine you just now found out that you made a **C** or lower in this course. How bad would you feel?	1	2	3	4	5	6	7
19	How **<u>dedicated</u>** are you to making a good grade in this course?	1	2	3	4	5	6	7
20	If you were studying for this course right now, would you put a lot of effort into studying?	1	2	3	4	5	6	7
21	Would you describe your overall outlook on life as **<u>optimistic</u>** rather than pessimistic?	1	2	3	4	5	6	7
22	Did you take this course mainly for **<u>interest</u>**?	1	2	3	4	5	6	7
23	Did you take this course mainly **<u>as a step</u>** toward other goals (e.g., career goals)?	1	2	3	4	5	6	7

24 Please write in the **<u>total number of hours</u>** per week you <u>expect</u> to study for this course: _____ **hours**

25 Please write in the **<u>total number of hours</u>** per week you think is <u>necessary</u> to study for this course: _____ **hours**

26	**<u>Making a good grade</u>** in this course means making a grade of AT LEAST:	A	B	C	D
27	The grade that you **<u>expect</u>** to make in this course is:	A	B	C	D
28	Your **<u>goal</u>** for this course is to make at least a grade of:	A	B	C	D

For questions 29-57, circle the number that best represents how *true* each statement is about you.

[For example, 1= Not at all true of me, 7= Very true of me]

		Not at all						Very
29	I find it hard to imitate the behavior of other people.	1	2	3	4	5	6	7
30	My behavior is usually an expression of my true inner feelings, attitudes, and beliefs.	1	2	3	4	5	6	7
31	At parties and social gatherings, I do not attempt to do or say things that others will like.	1	2	3	4	5	6	7
32	I can only argue for ideas which I already believe.	1	2	3	4	5	6	7
33	I can make impromptu speeches even on topics about which I have almost no information.	1	2	3	4	5	6	7
34	I guess I put on a show to impress or entertain people.	1	2	3	4	5	6	7
35	When I am uncertain how to act in a social situation, I look to the behavior of others for cues.	1	2	3	4	5	6	7
36	I would probably make a good actor.	1	2	3	4	5	6	7
37	I rarely need the advice of my friends to choose movies, books, or music.	1	2	3	4	5	6	7
38	I sometimes appear to others to be experiencing deeper emotions than I actually am.	1	2	3	4	5	6	7
39	I laugh more when I watch a comedy with others than when I am alone.	1	2	3	4	5	6	7
		Not at all						**Very**
40	In a group of people, I am rarely the center of attention.	1	2	3	4	5	6	7
41	In different situations and with different people, I often act like very different persons.	1	2	3	4	5	6	7
42	I am not particularly good at making other people like me.	1	2	3	4	5	6	7

43	Even if I am not enjoying myself, I often pretend to be having a good time.	1	2	3	4	5	6	7
44	I'm not always the person I appear to be.	1	2	3	4	5	6	7
45	I would not change my opinions (or the way I do things) in order to please someone else or win their favor.	1	2	3	4	5	6	7
46	I have considered being an entertainer.	1	2	3	4	5	6	7
47	In order to get along and be liked, I tend to be what people expect me to be rather than anything else.	1	2	3	4	5	6	7
48	I have never been good at games like charades or improvisational acting.	1	2	3	4	5	6	7
49	I have trouble changing my behavior to suit different people and different situations.	1	2	3	4	5	6	7
50	At a party, I let others keep the jokes and stories going.	1	2	3	4	5	6	7
51	I feel a bit awkward in company and do not show up quite as well as I should.	1	2	3	4	5	6	7
52	I can look anyone in the eye and tell a lie with a straight face (if for a right end).	1	2	3	4	5	6	7
53	I may deceive people by being friendly when I really dislike them.	1	2	3	4	5	6	7
54	I will stay in a group if they need me, even when I'm not happy with the group.	1	2	3	4	5	6	7
55	Even when I strongly disagree with group members, I avoid an argument.	1	2	3	4	5	6	7
56	It is important for me to maintain harmony within my group.	1	2	3	4	5	6	7
57	My happiness depends on the happiness of those around me.	1	2	3	4	5	6	7

For questions 58-72, circle the number that best represents the degree to which the statement

explains your motivation for studying this subject outside of class.

[For example, 1= not at all a motivation for me, 7= a very strong motivation for me]

		Not at all						Very
58	I'll enjoy studying the content of this course.	1	2	3	4	5	6	7
59	I believe the content of this course will be useful for me in my career.	1	2	3	4	5	6	7
60	This course is a requirement for my major.	1	2	3	4	5	6	7
61	If I don't study, I will feel bad about myself.	1	2	3	4	5	6	7
62	I can't get out of taking this course.	1	2	3	4	5	6	7
63	I value knowing the content of this course and believe it is important.	1	2	3	4	5	6	7
64	I'll get pleasure out of the time I spend studying for this course.	1	2	3	4	5	6	7
65	I think this course will be applicable to my school or work.	1	2	3	4	5	6	7
66	I want to feel like I am helping my classmates.	1	2	3	4	5	6	7
67	If I learn and understand the content of this course I will be a better person.	1	2	3	4	5	6	7
68	I have to get a good grade in this course to graduate.	1	2	3	4	5	6	7
69	I think studying the content of this course will be fun.	1	2	3	4	5	6	7

70	I care about what my classmates think of me.	1	2	3	4	5	6	7
71	Everyone should learn the content of this course.	1	2	3	4	5	6	7
72	I see how knowing the content of this course will serve me in my daily life.	1	2	3	4	5	6	7

For questions 73-83, circle the number that best represents your degree of agreement with the following statements. [For example, 1= Strongly Disagree, 7= Strongly Agree]

		Strongly Disagree						**Strongly Agree**
73	Working on a problem with no quick solution is a waste of time.	1	2	3	4	5	6	7
74	If you don't understand a chapter the first time through, going back over it won't help.	1	2	3	4	5	6	7
75	If you don't learn something quickly, you won't ever learn it.	1	2	3	4	5	6	7
76	Too many theories just complicate things.	1	2	3	4	5	6	7
77	Most things worth knowing are easy to understand.	1	2	3	4	5	6	7
78	Instructors should focus on facts instead of theories.	1	2	3	4	5	6	7
79	Good teachers never let you leave the classroom with doubts about subject matter.	1	2	3	4	5	6	7
80	There is nothing more annoying than a question that has more than one answer.	1	2	3	4	5	6	7

81	Issues are so complex today a person should adopt a single stance only on rare occasions.	1	2	3	4	5	6	7
82	Uncertainty may be the only thing that a person may be sure about.	1	2	3	4	5	6	7
83	Everyone should continually question the reasons why they believe what they do.	1	2	3	4	5	6	7

continued on next page

The items below inquire about what kind of person you think you are. For questions 84-107, circle the number that best represents how true each word or phrase is of you.

[For example, 1= Never true of you, 7 = Always true of you].

		Never						**Always**
84	Active	1	2	3	4	5	6	7
85	Independent	1	2	3	4	5	6	7
86	Emotional	1	2	3	4	5	6	7
87	Dominant	1	2	3	4	5	6	7
88	Excitable in a major crisis	1	2	3	4	5	6	7
89	Aggressive	1	2	3	4	5	6	7
90	Able to devote self completely to others	1	2	3	4	5	6	7
91	Gentle	1	2	3	4	5	6	7
92	Helpful to others	1	2	3	4	5	6	7
93	Competitive	1	2	3	4	5	6	7

94	Knows ways of world	1	2	3	4	5	6	7
95	Kind	1	2	3	4	5	6	7
96	Needs others' approval	1	2	3	4	5	6	7
97	Feelings easily hurt	1	2	3	4	5	6	7
98	Aware of feelings of others	1	2	3	4	5	6	7
99	Can make decisions easily	1	2	3	4	5	6	7
100	Never gives up easily	1	2	3	4	5	6	7
101	Cries easily	1	2	3	4	5	6	7
102	Self-confident	1	2	3	4	5	6	7
103	Feels superior	1	2	3	4	5	6	7
104	Understanding of others	1	2	3	4	5	6	7
105	Warm in relations with others	1	2	3	4	5	6	7
106	Need for security	1	2	3	4	5	6	7
107	Stands up well under pressure	1	2	3	4	5	6	7

End of survey. Thank you for your participation.

Appendix B Correlations

		sse	hism	wcdmot	intrin	id	epist	inst	exp	ind_avg	gamestot	team_avg
sse	Pearson Correlation	1	-.031	.224(*)	.014	.102	-.197(*)	.399(**)	.270(**)	-.129	.066	.091
	Sig. (2-tailed)		.758	.023	.886	.307	.046	.000	.006	.194	.510	.363
	N	103	103	103	103	103	103	103	103	103	101	102
hism	Pearson Correlation	-.031	1	-.123	-.321(**)	-.308(**)	-.014	.153	-.390(**)	-.164	.063	.025
	Sig. (2-tailed)	.758		.216	.001	.002	.892	.124	.000	.098	.533	.804
	N	103	103	103	103	103	103	103	103	103	101	102
wcdmot	Pearson Correlation	.224(*)	-.123	1	.511(**)	.428(**)	-.107	.166	.318(**)	.074	-.052	-.067
	Sig. (2-tailed)	.023	.216		.000	.000	.283	.094	.001	.458	.608	.501
	N	103	103	103	103	103	103	103	103	103	101	102
intrin	Pearson Correlation	.014	-.321(**)	.511(**)	1	.747(**)	-.175	.034	.115	.240(*)	-.372(**)	-.218(*)
	Sig. (2-tailed)	.886	.001	.000		.000	.076	.734	.246	.015	.000	.028
	N	103	103	103	103	103	103	103	103	103	101	102
id	Pearson Correlation	.102	-.308(**)	.428(**)	.747(**)	1	-.306(**)	-.025	.191	.126	-.230(*)	-.116
	Sig. (2-tailed)	.307	.002	.000	.000		.002	.803	.054	.205	.021	.247
	N	103	103	103	103	103	103	103	103	103	101	102
epist	Pearson Correlation	-.197(*)	-.014	-.107	-.175	-.306(**)	1	-.034	-.106	-.163	-.057	-.065
	Sig. (2-tailed)	.046	.892	.283	.076	.002		.733	.285	.100	.570	.516
	N	103	103	103	103	103	103	103	103	103	101	102
inst	Pearson Correlation	.399(**)	.153	.166	.034	-.025	-.034	1	.037	.018	-.141	-.126
	Sig. (2-tailed)	.000	.124	.094	.734	.803	.733		.711	.855	.158	.208
	N	103	103	103	103	103	103	103	103	103	101	102

(cont'd next page)

		sse	hism	wcdmot	intrin	id	epist	inst	exp	ind_avg	gamestot	team_avg
exp	Pearson Correlation	.270(**)	-.390(**)	.318(**)	.115	.191	-.106	.037	1	-.136	.026	-.074
	Sig. (2-tailed)	.006	.000	.001	.246	.054	.285	.711		.169	.797	.462
	N	103	103	103	103	103	103	103	103	103	101	102
ind_avg	Pearson Correlation	-.129	-.164	.074	.240(*)	.126	-.163	.018	-.136	1	.024	.309(**)
	Sig. (2-tailed)	.194	.098	.458	.015	.205	.100	.855	.169		.813	.002
	N	103	103	103	103	103	103	103	103	103	101	102
gamestot	Pearson Correlation	.066	.063	-.052	-.372(**)	-.230(*)	-.057	-.141	.026	.024	1	.419(**)
	Sig. (2-tailed)	.510	.533	.608	.000	.021	.570	.158	.797	.813		.000
	N	101	101	101	101	101	101	101	101	101	101	101
team_avg	Pearson Correlation	.091	.025	-.067	-.218(*)	-.116	-.065	-.126	-.074	.309(**)	.419(**)	1
	Sig. (2-tailed)	.363	.804	.501	.028	.247	.516	.208	.462	.002	.000	
	N	102	102	102	102	102	102	102	102	102	101	102

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Appendix C Sample Demographics

ALD 320

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	2.4	2.4	2.4
	Female	31	75.6	75.6	78.0
	Male	9	22.0	22.0	100.0
	Total	41	100.0	100.0	

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	2.4	2.4	2.4
	Asian or Pacific Islander	4	9.8	9.8	12.2
	Black	6	14.6	14.6	26.8
	Hispanic	6	14.6	14.6	41.5
	Multi-racial (parents are different ethinicities	3	7.3	7.3	48.8
	White (not of Hispanic origin)	21	51.2	51.2	100.0
	Total	41	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	2.4	2.4	2.4
	18-21	29	70.7	70.7	73.2
	22-25	10	24.4	24.4	97.6
	26-29	1	2.4	2.4	100.0
	Total	41	100.0	100.0	

EDP 371

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	6.5	6.5	6.5
	Female	44	71.0	71.0	77.4
	Male	14	22.6	22.6	100.0
	Total	62	100.0	100.0	

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Asian or Pacific Islander	13	21.0	21.0	21.0
	Black	3	4.8	4.8	25.8
	Hispanic	12	19.4	19.4	45.2
	Multi-racial (parents are different ethinicities	2	3.2	3.2	48.4
	White (not of Hispanic origin)	32	51.6	51.6	100.0
	Total	62	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-21	48	77.4	77.4	77.4
	22-25	11	17.7	17.7	93.5
	30 & over	3	4.8	4.8	100.0
	Total	62	100.0	100.0	

Appendix D Construct Means/Standard Deviations by Team

Team		SSE	SM	WCD Mot	Intrin	Id	Inst	Exp	Ind Avg	Games Tot
1.1	Mean	6.1	3.4	5.7	4.2	5.7	4.9	5.6	19.8	7.8
	N	5	5	5	5	5	5	5	5	5
	Std.Dev.	.86	.47	.62	1.79	.89	.67	.86	2.49	4.55
1.2	Mean	5.4	3.5	6.0	5.2	5.6	5.6	5.6	20.1	6.2
	N	6	6	6	6	6	6	6	6	5
	Std. Dev	.82	.74	.80	1.10	1.00	.70	.85	1.81	1.10
1.3	Mean	5.8	3.0	6.1	4.8	5.6	4.6	5.7	24.5	6.5
	N	6	6	6	6	6	6	6	6	6
	Std.Dev.	.76	.67	.60	1.16	1.22	.49	.32	2.13	2.07
1.4	Mean	5.3	4.0	5.5	3.6	4.0	4.9	4.9	23.7	18.4
	N	5	5	5	5	5	5	5	5	5
	Std.Dev.	1.16	.23	.51	.84	1.06	.41	.46	1.79	6.50
1.5	Mean	5.4	2.6	6.0	4.8	5.8	5.0	5.9	22.8	10.8
	N	5	5	5	5	5	5	5	5	5
	Std.Dev.	.80	.81	.35	.80	.98	.67	.80	2.91	4.60
1.6	Mean	5.3	3.3	5.4	4.2	4.7	4.9	4.6	24.8	11.0
	N	6	6	6	6	6	6	6	6	5
	Std. Dev.	.47	.81	.75	1.32	1.19	.54	.99	2.99	5.10
1.7	Mean	5.0	3.3	5.5	4.1	4.5	4.8	5.0	24.9	10.0
	N	4	4	4	4	4	4	4	4	4
	Std. Dev.	.78	1.15	.90	.97	.85	.61	1.58	3.72	3.65
1.8	Mean	4.6	2.5	6.0	5.0	6.0	4.2	5.4	23.0	20.0
	N	4	4	4	4	4	4	4	4	4
	Std. Dev.	1.50	.74	.25	.94	.34	.70	.65	1.22	.00

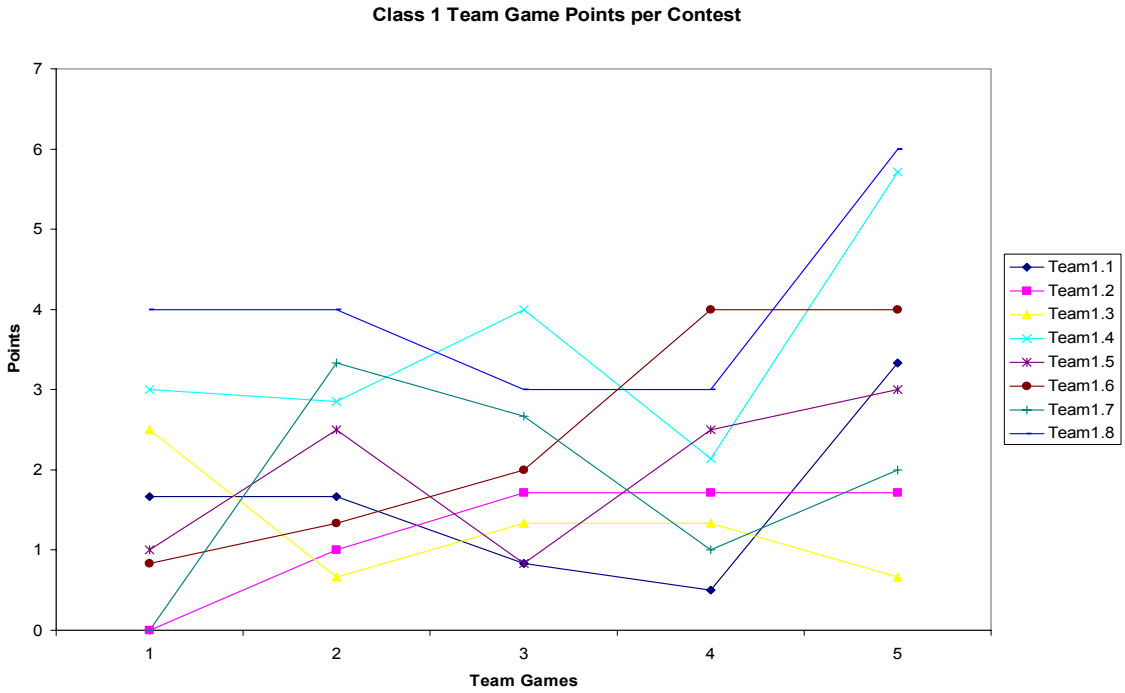
CONSTRUCT MEANS/STANDARD DEVIATIONS BY TEAM (CONT'D)

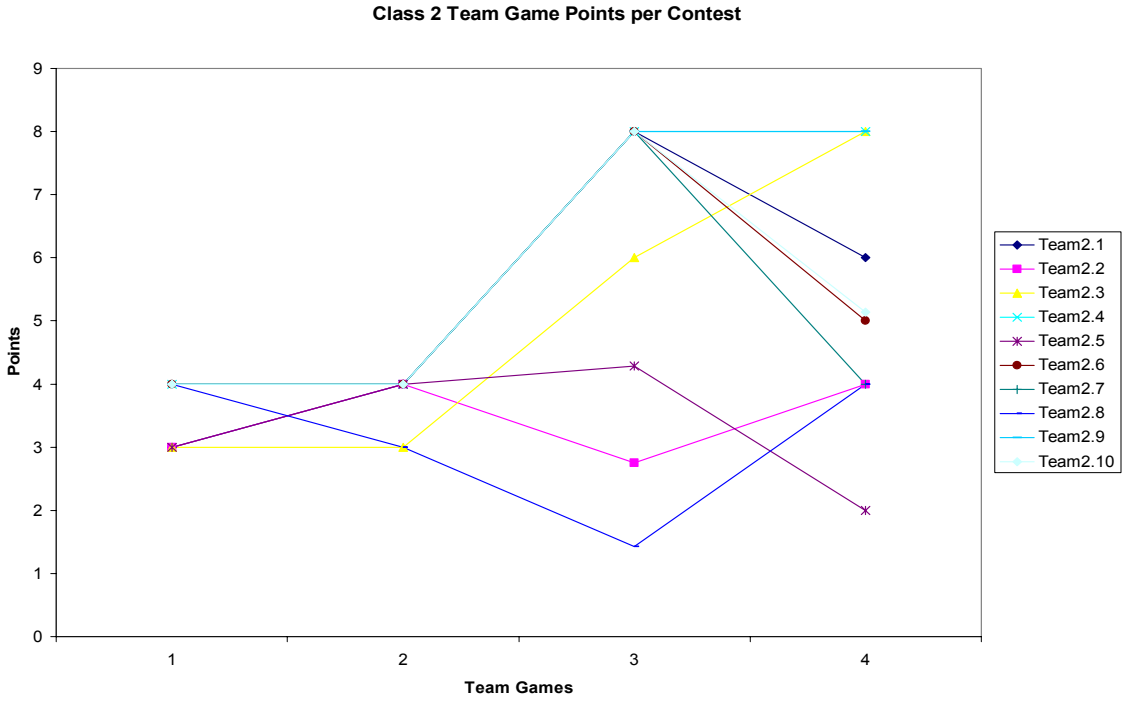
Team		SSE	SM	WCD Mot	Intrin	Id	Inst	Exp	Ind Avg	Games Tot
2.1	Mean	5.6	3.9	5.5	1.9	4.0	5.0	5.2	23.7	21.0
	N	7	7	7	7	7	7	7	7	7
	Std.Dev.	.72	.67	.53	.93	1.31	.81	.61	1.90	.00
2.2	Mean	5.5	4.1	5.7	2.5	4.0	4.9	5.4	20.4	13.6
	N	7	7	7	7	7	7	7	7	7
	Std.Dev.	.58	.81	.41	1.11	.58	.72	.73	2.01	1.90
2.3	Mean	5.8	3.5	5.9	2.6	3.6	4.9	6.3	19.9	19.2
	N	7	7	7	7	7	7	7	7	7
	Std.Dev.	.79	.71	.58	.95	1.32	.72	1.83	.82	2.36
2.4	Mean	5.0	3.5	6.1	3.8	5.1	4.8	5.2	23.0	22.4
	N	5	5	5	5	5	5	5	5	5
	Std.Dev.	1.09	.82	.26	.85	.88	.70	.54	3.60	3.58
2.5	Mean	5.3	3.3	6.0	4.5	5.2	5.3	5.4	25.1	14.0
	N	6	6	6	6	6	6	6	6	6
	Std.Dev.	1.23	.75	.48	.90	.73	1.18	.93	2.64	2.45
2.6	Mean	6.0	3.8	5.9	3.3	5.0	4.7	5.4	22.1	21.0
	N	6	6	6	6	6	6	6	6	6
	Std.Dev.	.29	1.01	.36	1.05	.33	.90	.89	3.62	2.45
2.7	Mean	6.3	3.1	6.0	4.0	5.0	4.9	5.9	23.5	20.0
	N	6	6	6	6	6	6	6	6	6
	Std.Dev.	.67	.68	.67	1.01	.89	.85	.60	2.74	.00
2.8	Mean	5.6	3.0	6.0	4.3	5.4	4.9	5.7	23.8	12.3
	N	6	6	6	6	6	6	6	6	6
	Std.Dev.	1.00	.93	.40	1.33	.74	.55	.80	2.70	1.03

CONSTRUCT MEANS/STANDARD DEVIATIONS BY TEAM (CONT'D)

Team		SSE	SM	WCD Mot	Intrin	Id	Inst	Exp	Ind Avg	Games Tot
2.9	Mean	5.5	3.2	5.7	3.1	4.7	4.6	5.6	23.3	24.0
	N	7	7	7	7	7	7	7	7	7
	Std.Dev.	.76	.93	.70	1.41	1.31	.78	.56	2.51	.00
2.10	Mean	4.9	3.5	5.8	3.1	4.0	4.6	5.4	22.1	20.8
	N	5	5	5	5	5	5	5	5	5
	Std.Dev.	1.09	.80	.35	1.43	1.16	2.40	.87	3.27	2.68

Appendix E Team Games Points Over Time





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Vita

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